



THOMPSON'S



GARDENER'S ASSISTANT





CARNATIONS:—

1, MEPHISTO. 2, CARDINAL WOLSEY. 3, BENDIGO. 4, GEORGE
5, PICOTEE:—MRS. GOODEN

CARNATIONS

Carnations and Picotees have long held a place among the choicest of garden flowers. Like the Rose, they have been beautified by doubling, a character which with few exceptions detracts from the beauty of a flower. They are beautiful in form, delightfully fragrant, they last a long time, and they may be successfully grown even in unfavourable localities. There are many varieties, and these are divided into groups according to the striping or flaking of the flowers, these groups being named *sells*, *flakes*, *bizarres*, *cloves*, &c. Picotees differ from Carnations in having laced instead of striped petals; they are merely sports from the Carnation proper. Tree Carnations are usually grown in pots, and where the conditions are favourable they are easily managed. Full directions for the cultivation of all the forms of Carnations will be found in the chapter devoted specially to them.

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THE GARDENER'S ASSISTANT

A PRACTICAL AND SCIENTIFIC EXPOSITION OF THE
ART OF GARDENING IN ALL ITS BRANCHES

BY

ROBERT THOMPSON

OF THE ROYAL HORTICULTURAL SOCIETY'S GARDENS, CHISWICK

NEW EDITION

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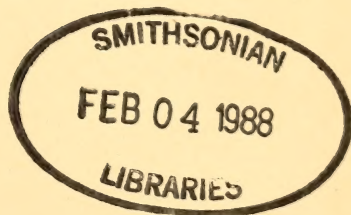
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AND NUMEROUS OTHER EMINENT SPECIALISTS

ILLUSTRATED BY NUMEROUS ENGRAVINGS IN THE TEXT,
AND A SERIES OF PLATES IN COLOUR, AND OF PLATES IN BLACK-AND-WHITE

Divisional-Vol. III



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COLOURED PLATES

CARNATIONS—1, Mephisto; 2, Cardinal Wolsey; 3, Bendigo; 4, Georga.
 PICOTEE—5, Mrs. Gooden.
 DENDROBIUM PHALÆNOPSIS.
 LAPAGERIA—1, Rosea; 2, Rosea Alba.

Camellias frequently suffer for want of pruning. Strong shoots will often spring from the centre, and if not shortened back in time, are certain to weaken the already weaker side shoots. Where the plants have been allowed to grow out of shape, or have been too much crowded, so as to cause them to get naked at the bottom, it often becomes necessary to head them down. This should take place two months before they commence growth, removing them to a temperature of 60°, and keeping the soil fairly dry until they have broken.

Camellias may be planted in either peat or loam, or a mixture of both. In peat they make free growth, and the foliage is always of a rich green; but the disposition to flower is not so free, especially with young plants, unless the supply of water is restricted at the time when the flower-buds should set. A mixture of peat and loam is used by some growers; others prefer loam alone, containing plenty of fibre, and broken in pieces about the size of walnuts, or larger for large specimens, enough clean sharp sand being added to keep the whole porous. The quantity of water they require in the growing season makes it necessary that the soil should be open. Where good loam cannot be procured we advise the use of peat of good quality. The best time to repot them is just after they have completed their growth. Where the flowers are required in October, it is necessary to start the plants into growth early. When about to set their flowers, the shoots thicken at the points, the terminal leaves having attained their full size. This is the time to pot such as require more root-room. The operation must not be delayed until the buds are fully formed or they will drop off prematurely. If Camellias are potted after flowering, the disturbance of the roots always interferes with the season's growth. They do not require repotting often, as they will grow to a large size with comparatively little root-room. Newly-imported continental-grown plants should be potted into firmer soil as soon as received.

As they complete their growth, and the terminal buds become visible, they should be kept as dry as is safe without causing the leaves to flag. After the flower-buds have set, the soil should be kept moderately moist, or the buds will fall off. Liquid manure, if applied with judgment during the time of growth, is of great assistance to plants that are wanting in strength, or too much restricted at the root, or that have flowered very heavily. It may be made from sheep or horse droppings or guano,

adding a little soot, which keeps worms in check, and imparts a dark-green colour to the leaves.

Cuttings of free-growing sorts will strike at any time of the year, but preferably when the wood is nearly ripe, towards the close of the growing season; they may consist of the entire shoot, 4 or 5 inches long, or shortened to one or two joints, and should be inserted in pots of sandy peat plunged in bottom-heat; they will root in five or six weeks. Cuttings made of the ripe wood require to be placed in a cold frame or pit until they have callused, when they may be removed to a heated pit.

Camellias may be grafted at any time of the year, but the best time is the early spring before growth has commenced. Good-sized specimens of inferior kinds, with stems an inch or more in diameter, may be headed down and cleft-grafted, putting two or four grafts in each. These, if in a healthy condition, soon make very fine heads.

Insects.—Camellias are subject to attacks of both brown and white scale, and if allowed to go unchecked they soon increase to a serious extent. They are easily removed with an ordinary tooth-brush after a thorough syringing with water at 95° to 100°, applied as soon as growth is completed, and again before the buds begin to swell. A strong solution of carbolic soap is also effectual, but it should be afterwards washed off with a syringe or hose. The plants are much benefited by having their leaves sponged over once or twice a year to remove all accumulations of dirt.

Select List of Varieties.

- Adrien Lebrun.* Large red, beautifully imbricated.
- Alba-plena.* One of the best whites.
- Archduchesse Marie.* Cerise, striped with white.
- Bealii.* Crimson, one of the best, a free late bloomer.
- Bella portuensis.* An improvement on Jubilee.
- Bonomiana.* White, striped rosy-carmine.
- Chandleri Elegans.* Light-rose; flower large.
- C. H. Hovey.* Deep-crimson, fine form.
- C. M. Hovey.* Scarlet, very large; one of the best.
- Comte de Paris.* Salmon-pink edged with white.
- Contessa Lavinia Maggi.* The best white striped variety.
- Countess of Ellesmere.* White, striped-rose; variable.
- Countess of Orkney.* White, striped-carmine.
- Donckelaari.* Crimson, marbled-white; semi-double.
- Eximia.* Crimson-scarlet; of fine form.
- Fimbriata.* White, imbricated and fringed.
- Henri Favre.* Rosy-salmon; one of the best.
- Imbricata.* Crimson, imbricated; one of the best.
- Jubilee.* Pinkish-white, splashed with rose.
- Lady Hume's Blush.* White, flushed with rose.
- La Reine.* White, splashed with carmine.
- Madame A. Verschaffelt.* White, spotted-red.
- Marchioness of Exeter.* Very large; fine rose-colour.
- Mathotiana.* Brilliant-red; large.

Mathotiana alba. Pure-white, imbricated.
Mathotiana rosea. Clear-rose, large.
Monarch. Beautiful dark-scarlet; semi-double.
Mrs. Cope. White, striped-crimson, imbricated.
Pearl. White; one of the finest.
Princess Mary. Red crimson, with shell-like petals.
Queen Victoria. Carmine, banded-white.
Reticulata flore-pleno. Bright rosy-lake.
Saccoi nova. Bright-rose, pink-edged.
Tricolor imbricata. White, crimson stripe on each petal.
Verschaffeltii. Pale-rose, striped with white.

[J. H.]



Fig. 524.—Canna Italia: to show habit.

Canna (fig. 524).—This genus has had a place in gardens since the introduction of *C. indica* in 1596. Roscoe's Monograph, published in 1806, contains twenty-four coloured plates of Cannas. According to Mr. Baker's review of the genus, published in 1894, there are sixteen good species only. They are fine plants, with bold foliage from 4 to 8 feet high, and branched spikes of red or yellow flowers.

It was not until 1840 that they were taken special notice of by florists, whose first efforts

were devoted to their improvement as foliage plants for the subtropical garden—the taller species being mostly used. Deep-brown and even crimson-brown leaved kinds were obtained. *C. Ehemannii*, a hybrid with large crimson flowers, first drew attention to the possibility of obtaining Cannas remarkable for their flowers as well as for their fine leaves. From this, crossed with *C. Warscewiczii* and *C. glauca*, both short-tubed species, the modern garden varieties have sprung. Their progeny have intercrossed readily, and hundreds of fine seedlings have been the result.

M. Crozy, of Lyons, took the lead in breeding garden Cannas. Victor Hugo and Felix Crouson were amongst the kinds that drew special attention to Cannas in the gardens of the 1868 Paris Exhibition. Madame Crozy, still one of the best, appeared a few years later. Since then Cannas have rapidly improved as florists' flowers until the present high standard has been reached.

A perfectly distinct strain was raised by Dammann of Naples, with very large flowers and dark-green leaves. They were obtained by crossing some of the best of Crozy's seedlings with *C. flaccida*; but the petals are not firm enough to stand our English out-door climate. They are, however, first-rate plants for the greenhouse and stove. The best of them are Italia, Austria, America, and Burbank.

Cultivation.—Cannas are useful as pot-grown plants under glass—grown in either large or small pots according to the size of plants desired. They flower freely out-of-doors when treated as Dahlias, the tubers being started in a greenhouse. Seeds from the best varieties are offered by dealers, and these yield a fair percentage of good sorts, which are serviceable for ordinary decoration both outside and under glass. They are easily propagated by division of the fleshy rhizomes in early spring; a bed of cocoa-nut fibre with bottom-heat being a convenient and suitable material for them to root in. They should be lifted and potted as soon as they have made new growth and roots, planting them in rich, well-prepared ground when danger from spring frost is past. They should be thoroughly watered twice a week. In ordinary seasons they flower from July until killed down by the early frosts, when the roots should

be taken up and stored in a dry shed or cellar until the following spring. Another plan is to take them up before the cold injures them, potting them and keeping them in flower with heat throughout the winter. They can also, when grown in pots, be cut down and liberally treated to encourage young growth in a warm light house, where they make good indoor winter-flowering plants.

The following is a short list of the best varieties, which include all colours—red, salmon, rose, orange, pure-yellow, and an approach to white:—

Alliance.	Kaiser Wilhelm II.
Alphonse Bouvier.	Maid of Guernsey.
Amie J. Chretien.	Mme. Crozy.
Antoine Chantin.	Mme. Pichon.
Aurora.	Paul Lorenz.
Beauté Poitevine.	Paul Marquant.
Chicago.	Prof. Gerard.
Comte de Bouchaud.	Queen Charlotte.
Conquerant.	Robert Christie.
Dr. Doleris.	Sister Dora.
Duke of Marlborough.	Souvenir d'Antoine Crozy.
Franz Buchner.	Souvenir de President Car-
Germania.	not.

[G. P.]

Carnation and Picotee (*Dianthus Caryophyllus*).—Among the few plants of our native flora that have become popular as florists' flowers the Carnation holds a foremost place. Compared with its garden progeny the type is small and unattractive. It grows plentifully on the walls of Rochester Castle. Cultivated varieties were known to Gerard in 1598, when they were grown in pots and protected in winter. Thirty years later Parkinson in his *Paradisus* mentioned twenty-nine varieties, including one called *Daintie Lady*, identical with the *Painted Lady* of modern fanciers. In 1824 Thomas Hogg published a classified list of varieties. He was the first to separate the Picotee from the Carnation. According to his descriptions there was as great a range of variation in the colours of the flowers as there is now. Many of the varieties were of German origin. Mr. Martin R. Smith has raised many seedlings and has produced some new types, the *Malmaison* seedlings being the greatest advance during recent years. Their colours are principally crimson and rose of various shades.

In selecting plants for seeds or for breeding purposes avoid all with a short calyx, which are likely to split. Flowers that are crowded with small petals are also objectionable, as they invariably burst the calyx by expansion. The selected plants should be placed together

for convenience of manipulation. The beginning of July is the most favourable time for crossing. The horn-shaped styles of the Carnation are attached to the apex of the ovary, and they rapidly develop as the flowers expand; when in a receptive condition they are slightly curled, and furnished with delicate fine hairs or down. The pollen, which is produced on the petals, is generally in a powdery state about mid-day. It should be gathered on to a fine camel-hair brush and gently placed on the hairy pistils. It is well to touch the same flowers with pollen two or three days in succession to ensure fertilization. In wet weather the pollen is lumpy and quite unfit for use. As the petals fade pull them out, or they may cause the seed-pod to decay. Seeds ripen in September from flowers fertilized in July. As soon as the seed-pods become brownish and slightly open at the top, they may be gathered and dried. In Britain seeds can seldom be matured out-of-doors; an airy glass house where the plants are fully exposed to all the light they can obtain being most suitable.

Sow the seed in March or April in pans on a hot-bed, where it will germinate in about eight days, and in another eight days the young plants may be pricked into boxes or frames. In June or July they will be ready to plant out where they are to flower the following season. The soil should be deep and rich; and the plants require to be planted about a foot apart.

Layering.—This should be done in July and August, whether the plants are grown in pots or in the border. The "grass", or young growths produced at the base of the plants, form the layers, and the stronger they are the better. Three or four pairs of the lower leaves should be removed. The best layering knife has a two-edged, very thin blade, which is thrust through the joint about the middle and pressed downwards, bringing it out just below the joint. The layers should be pegged down with wood pegs into a compost of loam, leaf-mould, and sand, and kept moderately moist. By the end of September they will have rooted, and may be removed and potted or planted out. Those planted in pots should be placed near the glass in a cold frame, keeping the lights rather close for a few days, after which more air may be admitted, and in ten days or so the lights may be pulled off altogether on fine days, replacing them at night, but tilting them at the back of the frame. The choicer

varieties should be grown in pots and placed under glass or an awning of tiffany to bloom, the best flowers being thus obtained.

Propagation by slips or "pipings" is slow and troublesome, and is seldom resorted to except for scarce varieties, or when the slips cannot conveniently be layered. They may be put in any time during the summer or early autumn months, placing them under close bell- or hand-glasses. Or gentle bottom-heat may be used, keeping them rather close until roots have been formed. It is necessary to remove the glasses daily and wipe them dry.

Soil.—Carnations prefer a deep medium yellow loam, enriched with decayed stable manure and sand. Wire-worms are very injurious; the compost should therefore be looked over to see that it contains none of them, one wire-worm being sufficient to destroy two or three plants. Some growers add old mortar rubbish to the compost, and the plants seem to like it; it also helps to keep the soil open.

General Culture.—Starting with the rooted layers in October, those intended for pot culture should be kept in a frame during the winter. The pots need not be plunged, but stood on a hard bottom. In March or April they should be repotted into 8-inch pots, placing two plants in each pot. Firm potting is desirable.

They thrive best when kept under the glass lights until the end of April, when they may be staked and removed to their summer quarters, which should be a bed with a hard bottom of coal ashes. In May or June they require to be top-dressed with a mixture of equal portions of loam and decayed manure. When the flower-buds appear it will be necessary to remove some of them if large flowers are desired, whilst to obtain very large blooms for exhibition only the terminal bud is left. During hot weather the plants require plenty of water, and if syringed once daily green-fly will be kept in check. This pest is sometimes very troublesome, and has to be destroyed by the use of tobacco powder. As soon as the calyx bursts and the petals begin to unfold, it is better to take the plants under glass. Should the calyx burst open on one side, a slit should be made on the other side, and supported with a loose tie of bast; if tied too tightly, the petals have not room to expand. The flowers last longer when they are shaded.

Tree or perpetual-flowering Carnations differ from the ordinary type by their tendency to produce lateral shoots on the stems, thus forming a sub-shrubby plant. Occasionally these

shrubby varieties occur in collections of seedlings. They are usually propagated in January or February by cuttings, seldom by layering. The cuttings are inserted seven or eight in 3-inch pots, in a compost of equal parts of loam, leaf-mould, and sand, covered with a bell-glass, and placed in a gentle bottom-heat in the forcing-house, kept at a temperature of 55°. When rooted they are potted singly into thumb-pots, and kept in the forcing-house for a few days. After a time they may be repotted into 3-inch pots and placed in a frame, where they can get abundance of air night and day; this induces sturdy growth. By the end of May they should be quite in the open garden. Some cultivators plant them out, lifting and repotting them again in September; but they are apt to get a check when thus treated, and it is better to keep them in pots. Their final shift should be into 6-inch or 7-inch pots, or if small plants, 5-inch pots. These may be grown on a second year by repotting them into 8-inch pots, or even a third year, by which time the stem becomes quite woody. The plants should stand during the summer on a hard bottom of coal ashes. Carnations like a light airy situation at all times, and more especially in the winter when the flower-buds are opening. The flowers are poor in quality unless the greenhouse is kept at a temperature of 50° to 55° in the winter.

Another distinct and decorative type of Carnation is the "Marguerite", a recent introduction, of dwarf bushy habit. The flowers, which are clove-scented, are produced very freely on short stems, and are very varied in colour, some being selfs and others striped. Seed sown in February or March soon develop plants which, if put out in good soil, will produce flowers the same season. They are excellent for pot culture.

Select List of Varieties.

Scarlet Bizarres.—Admiral Curzon, Alfred, Fred, Robert Houlgrave, Robert Lord, Squire Potts.

Crimson Bizarres.—Edward Rowan, Harrison Weir, Homer, Master Fred, Phœbe, Virgil.

Pink and Purple Bizarres.—Autocrat, Harmony, Mrs. Barlow, Niobe, Sarah Payne, Wm. Skirving.

Purple Flakes.—Agricola, Charles Henwood, Florence Nightingale, James Douglas, Mayor of Nottingham, Mrs. Douglas.

Scarlet Flakes.—Alisemond, Henry Cannell, John Ball, Matador, Miss Constance Grahame, Sportsman.

Rose Flakes.—Lady Mary Currie, Mrs. Rowan, Rob Roy, Rosa Mundi, Thalia, William of Wykeham.

Picotees—Light Red Edge.—Dr. Horner, Euripides, Mrs. Bower, Mrs. Gorton, Thomas William, Violet Douglas.

Heavy Red Edge.—Brunette, Ganymede, Isabel Lakin, J. B. Bryant, John Smith, Princess of Wales.

Light Purple Edge.—Ann Lord, Clara Penson, Diana, Her Majesty, Nymph, Silvia.

Heavy Purple Edge.—Amelia, Baroness B. Coutts, Calypso, Mrs. Chancellor, Muriel, Zerlina.

Light Rose and Scarlet Edge.—Cordelia, Ethel, Liddington's Favourite, Melpomene, Mrs. Ricardo, Venus.

Heavy Rose and Scarlet Edge.—Constance Heron, Edith D'Ombraïn, Mrs. Harford, Mrs. Payne, Mrs. Sharp, Royal Visit.

Yellow Ground Picotees.—Annie Douglas, Chrysolora, Countess of Jersey, Diomedes, Lilian, Mrs. Henwood, Mrs. R. Sydenham, Mrs. Walford, Mrs. Whitbourn, Remembrance, Stradrath Bail, Undine.

Sells and Fancies.—Abigail, Aline Newman, Cardinal Wolsey, Constantine, Duchess of Teck, Duke of Orleans, Germania, Hayes Scarlet, King Arthur, King of Crimson, King of Scarlets, Lady Gwendoline, Lord Rendlesham, Mephisto, Miss Audrey Campbell, Mrs. Fred, Mrs. Louise Jameson, Mrs. R. Hole, Niphetos, Old Coin, Oriflamme, Romulus, Ruby, Terra Cotta, The Hunter, Theodore, The Pasha, Vice President.

Tree Carnations.—Mdlle. Carle, Mdm. Therèse Franco, Miss Joliffe (Improved), Mrs. Llewelyn, Mrs. Moore, Purity, Sir E. H. Calcraft, Uriah Pyke, Winter Cheer.

Malmaison Carnations.—Mrs. Everard Hambro, Princess May, Sir Evelyn Wood, Sir Charles Fremantle, Souvenir de la Malmaison, Souvenir de la Malmaison (pink), The Churchwarden.

Chrysanthemum.—The Chrysanthemum is one of the most popular flowers in cultivation, and one of the most useful for all decorative purposes. While it shares popularity with the Rose, it can be grown where the Rose will not flourish, and in many a back-garden in that huge industrial centre which stretches from Aldgate to Stratford, and is enclosed by the river Lea on the north and the Thames on the south, there can be seen in autumn many a home-constructed greenhouse aglow with blossoms of the golden flower. This is also true of provincial cities and towns. The Chrysanthemum is extensively grown for exhibition purposes. There are to be found all over Great Britain societies whose special work it is to promote the culture of the flower for show purposes, and they exist also in our distant colonial possessions. Hundreds find employment in propagating the Chrysanthemum for trade purposes; its culture as a flowering plant for market has grown into a great commercial industry.

The History of the Chrysanthemum.—Records show that the flower was held in high esteem in China and Japan many years before its introduction to Europe. In 1764 a plant of Chrysanthemum was growing in the Botanic Garden at Chelsea, but it attracted little attention and was soon afterwards lost. In 1789 an enterprising French merchant imported some plants from China, but only one survived; in the year following a purple-coloured variety came to this

country, and became the progenitor of the large-flowered section. Within the next fifty years the Chrysanthemum became much grown and greatly improved, and by 1850 there were many varieties in cultivation and Chrysanthemum exhibitions were held. France led the way in raising new varieties from seed, the warmer and drier parts of the south of that country being favourable to seed production. A large number of seedlings were also raised in Guernsey.

In 1846 Mr. Robert Fortune brought from China the Chusan Daisy, the progenitor of the Pompon Chrysanthemum, and in 1862 the Japanese type was sent home by him. The strange fantastic form of the latter soon laid hold upon the popular taste, and its culture was followed by a rapid improvement in form and variety. It is now more largely grown than all the other types put together. Many seedlings have been raised in our own country, on the Continent, in our Colonies, and in the United States of America, and there have been occasional introductions from Japan. The Japanese Chrysanthemum is simply a form of the Chinese type modified by cultivation. The Incurved section, one of the most interesting, is the most difficult to produce in its highest forms. For many years but few new varieties were added, and these were mostly sports. The tendency to sport has manifested itself more or less in all the sections of the Chrysanthemum, many good varieties having been obtained in this way.

Propagation.—Cuttings formed of the new shoots which are thrown up from the root-stock in winter, root readily. It is customary with dealers in Chrysanthemums to make a plantation in the open of leading varieties specially for the production of cuttings, and these are to be preferred to those obtained from highly-fed plants grown to produce exhibition flowers. December, January, and onwards are the busiest times for taking cuttings; the stock plants being transferred from the open to borders in cold or slightly heated houses, where they continue to yield a supply. Cuttings struck in a temperature of from 45° to 50° in December and January make vigorous plants by February and March. A suitable compost for the cuttings is a mixture of sifted loam, leaf-soil, cocoa-nut fibre, and coarse sand in equal parts. The usual length for a cutting is 3 inches. They may be put singly in small pots, or three or four may be placed in a 3-inch pot, and plunged in a mild

heat, or the pots may be placed under a hand-light or small frame, where they can be kept close until rooted. If well watered when planted, they will not require more until rooted. No attempt should be made to force the cuttings into growth in any way.

In a month they may be potted into 4-inch pots in a soil consisting of three parts fibry loam, one part leaf-soil, and one part rotten manure, sand, and wood ashes, placing them in a house or frame, and keeping them close for two or three days. By the middle of April another shift may be given into 5-inch pots. It is better to under-pot rather than over-pot at this stage. The compost preferred by one of the most successful growers is three parts fibrous loam, one part leaf-mould, two parts well-decomposed stable manure, a good sprinkling of silver sand, some sifted lime rubbish, with the addition of 1 pound weight of dissolved bones and bone-meal to each bushel of the compost. The soil should be pressed firmly into the pots. If convenient, the plant should stand in a frame for a few days after repotting, and then be placed in the open on a bed of cinder ashes. If this shift has been given in May, and the plants are placed in the open within a week, protection against frost should be at hand. Early in July the final shift should be given, provided that the roots have reached the sides of the present pots. The compost for this shift should be the same as that used for the previous one. It should be prepared quite a month before being used, and be turned two or three times. The pots for the final shift may be 7-inch to 9-inch. Perfect drainage an inch deep is necessary. The soil should be well rammed, and a space of about 2 inches left for water. Too much stress cannot be laid upon the importance of firm potting at this stage. The plants may now be placed in lines in the open, so that sunlight and air may have free access to them. Staking and security against winds and storms should have due attention. These directions are for the cultivation of the Incurved, Japanese, Reflexed, and large Ane-mone-flowered sections.

Pompons.—The cuttings of these should be taken in January or February. A bushy habit should be aimed at, but if grown for exhibition blooms, disbudding must be practised; terminal rather than crown buds produce the best blooms, and they should be selected from the middle of August to the middle of September according to the variety and the season.

Early-flowering Chrysanthemums.—These are mainly Japanese varieties, but some are Pom-

pons, and a few it is difficult to classify. They are mainly of dwarf-bushy growth, free of flower, and they require little if any disbudding. For cutting for market and for decorative purposes they are invaluable. Cuttings of these need not be struck until February or March, and as soon as they are strong enough they may be planted out in the open in a sheltered position. It is well to stop the leading shoots two or three times. They are very useful in the flower border, flowering in July and August. They are also grown in pots for the conservatory in early autumn.

Single-flowered Chrysanthemums.—There are many pretty varieties of these, both large and small flowered. The cuttings should be struck in March, and when strong enough planted out in the open, stopping the shoots if they make long breaks. The later-flowering varieties may be lifted and potted to bloom in February. Or, instead of planting out in the open, they may be grown on in pots, stopping the shoots when 6 inches high. With care it is possible to have nice specimens in 6-inch pots that will flower freely.

Housing the plants.—As they need warmth and a dry atmosphere to produce fine blooms and keep down mildew, an early vinery may be utilized for the purpose, although a plant-house which can be wholly devoted to the purpose is best. By the first week in October, even in the driest parts of the country, the plants should be under protection. The varieties earliest to flower may occupy the coolest and shadiest parts of the house; the later-flowering, the warmest and most airy. One well-known cultivator recommends that "after the house is filled and the foliage has become perfectly dry, choose a still night, shut the house up close any time after the sun has ceased to shine upon it, and give it a thorough fumigation with nicotine or 'XL All' Vaporizing Compound. The ventilators should be reopened as soon as the fumes have passed away, say four hours or so after fumigating." Plenty of air should be given both night and day, but the side ventilators should be closed at night against damp air. In dull cold weather a little fire-heat may be put on merely to dry up moisture and assist the expansion of the blooms. Watering should be done early in the day, and unnecessary wetting of the foliage should be avoided. Stimulants, such as weak guano-water, should be used with caution.

"If flowers are required for exhibition, and are likely to be ready too soon, they may be cut



C. INDICUM (the Wild Type)



MADAME CARNOT (Japanese)



AMY FURZE (Reflexed)



QUEEN ELIZABETH (Anemone)

with stems a foot long two days before they are fully expanded, and put in water in a dry, dark, and cool place. It is easier to keep a flower a week than to push it on so as to gain a day. A flower is at its best when it has all the centre florets well up, and none of the basal florets have begun to decay."

Such important matters as stopping, taking the bud, and whether crown or terminal buds are preferable, can be determined by a knowledge of the varieties gained only by experience. Mr. H. J. Jones has laid down the following general principles: "Respecting the early-flowering section, the varieties should be allowed to break naturally, and many of them being branching in their habit of growth, they continue to develop shoots until the terminal buds appear; in cases where the buds are thickly displayed, a few of these should be rubbed out; but in many cases the foot-stalks continue to grow, and at length each flower is developed upon a long stem. There are three kinds of buds known to Chrysanthemum growers: the break bud, formed the second or third week in May; the removal of this bud causes the plant to make several shoots, and the grower should select from three to six of these according to the number of flowers he wishes the plant to produce, removing all the rest. At the tips of these shoots the second bud will be formed, and this is known as the crown bud; as a general rule this bud gives the largest and best flower. When this bud appears, which should be in August, all the shoots round it should be removed, so that the whole force in the shoots may go to the development of the bud it carries. Should the crown bud appear before August, remove it, and allow only one of the shoots around it to grow. This as a rule gives a second crown bud, but sometimes it forms a third kind, termed the terminal bud, and known by having a cluster of small buds round it instead of shoots."

Insect Pests.—Chrysanthemums are subject to the attacks of green and black fly; an effectual remedy is one of the insect powders prepared for the purpose. Frequent syringing, in warm dry weather, also helps to keep fly under. The earwig, if not kept down by means of traps, is a source of trouble, injuring the buds and young shoots. A small bug or fly which lodges about the points of the young shoots should be exterminated. A white thrips is occasionally troublesome during dry weather; it may be kept in check by syringing the plants with soot-water. The leaf-miner sometimes attacks Chrysanthemums (see p. 83).

A fungus disease known as rust affects the tissues of the leaves, and, forming spores which ripen and burst, is carried about in the atmosphere. As soon as the presence of the rust is noticed, any plants affected by it should be isolated, the spotted leaves removed and burned, and the plants then be sprayed with sulphide of potassium, a half-ounce of it being dissolved in a gallon of water. This has been found a thorough cure if the plants be taken in hand as soon as the rust is perceived. (See also Chapter XIII. on "Fungus Diseases").

Seedlings.—It is difficult to secure home-saved seeds, as they do not ripen freely during the winter months. When obtained they should be sown in March in gentle heat. The seedlings, if well managed, may flower in the November following, but a second season's growth is needed to reveal their true character. New varieties are also obtained by sports, termed by the botanist bud variations. Without any apparent cause a plant will develop a shoot which differs from all the rest, it may be in leaf or flower, in form or colour, or both, and this shoot, if removed and treated as a cutting or a graft, will probably have all its characters fixed and perpetuated. The same variety of Chrysanthemum has been known to sport in several widely separated places simultaneously. Many of the best varieties have been obtained in this way.

Grafted Chrysanthemums.—The Paris Daisy, *C. frutescens*, has been used as a stock for the Chinese Chrysanthemums. Val d'Andorre, grafted on to this stock, grew in two years nearly 9 feet through, and bore 790 well-formed flowers. The graft was made in January, and the plant was shifted on until, when about twenty months old, it was planted in a tub a yard across. The Paris Daisy is recommended as a strengthening stock for weakly seedlings.

Selection of Fifty Japanese Varieties.

Australian Gold.—Canary-yellow; fine exhibition variety.

Australia.—Rosy-amaranth suffused with white.

C. F. Payne.—Yellow, striped red; fine exhibition variety.

Charles Davis.—Rich rosy-bronze, sport from *Vivian Morel*.

Duke of Wellington.—Buff, deeply shaded with salmon.

Edith Tabor.—Pale-yellow, long drooping florets.

Edwin Molyneux.—Rich crimson, gold reverse, broad florets.

Ella Curtis.—Golden-yellow shaded with chestnut.

Emily Salisbury.—Pure white, large.

Eva Knowles.—Orange-red shaded deep-red.

G. J. Warren.—Pale-yellow, sport from *Madame Carnot*.

H. J. Jones (see Plate). Rich glowing crimson, drooping petals.

Hon. W. F. D. Smith. Deep crimson, otherwise like *Mde. Carnot*.

John Pockett. Indian-red, gold reverse; broad recurved florets.

John Seward. Bright canary-yellow, 9 inches in diameter.

Julia Scaramanga. Large, bronze-yellow, tinted rose.

Lady Byron. Ivory-white, shaded green in centre.

Lady Crawshaw. Pearly-white and flesh-pink.

Lady Esther Smith. Ivory-white, large, very fine.

Lady Hanham. Cerise, shaded yellow; sport from *Vivand Morel*.

Lady Ridgeway. Salmon-buff, shaded rose.

Lilian B. Bird. Flesh-pink, very large, tubular petals.

Lord Ludlow. Golden-amber and red.

Madame Carnot. White, an immense flower.

Mary Molyneux. Rose-lilac to rose-peach.

Mdlle. M. A. de Galbert. Pure-white, large and full.

Miss N. Pockett. Cream-white, florets curled at tips.

Modesto. Rich deep golden-yellow.

Mons. C. de Leche. Salmon-red, a fine variety.

Mons. Panchouke. Yellow, long florets, grand variety.

Mrs. C. Probin. Bright-pink, silvery reverse.

Mrs. G. W. Palmer. Bronzy-yellow, enormous.

Mrs. H. Weeks. White, shaded pink.

Mrs. J. Lewis. White with reflexed florets, early.

Mrs. J. W. Barks. Bronzy-rose with buff reverse.

Mrs. W. H. Lees. White, tinged pink, drooping curled petals.

Mrs. W. Popham. White, tinted carmine.

Mutual Friend. Pure-white, very large, spreading.

N. C. S. Jubilee. Pale pearly-mauve, *Louise* type.

Niveus. Snow-white, beautiful in form.

Oecana. Golden-yellow, broad incurved florets.

Phobus. Chrome-yellow, large well-formed, good habit.

President Bord. Bright carmine-rose.

Pride of Exmouth. White, shaded pink.

Pride of Madford. Rich-amaranth, large flower.

R. Hooper Pearson. Magnificent flower, bright rich-yellow.

Simplicity. Pure-white, long drooping florets, dwarf.

Souvenir d'une Petite Amie. White, incurved petals.

Surpasse Amiral. Bright-yellow, shaded red.

Thomas Wilkins. Chrome-yellow, broad spreading florets.

Vivand Morel. Mauve, very large, well-shaped.

W. Cursham. Rosy-fawn and yellow.

Selection of Twenty-five Incurved Varieties.

Baron Hirsch. Orange-cinnamon, full, early.

Charles H. Curtis (see Plate). Deep-yellow, splendid form.

Duchess of Fife. White, an immense flower.

Empress of India. White, sport from *Queen of England*.

George Haigh. Carmine-rose, shaded golden bronze.

Globe d'Or. Deep buff-yellow, very free and good.

Golden Empress of India. Yellow sport.

Hanwell Glory. Bright bronze and yellow.

J. Agate. Pure-white, very large.

Jeanne d'Arc. Blush-white tipped with purple.

John Lambert. Golden-yellow shaded with bronze.

Lady Isabel. Lavender, large, broad smooth petals.

Lord Alcester. Primrose sport from *Empress of India*.

Lucy Kendall. Coral-red sport from *Violet Tomlin*.

Madame Ferlat. Pure-white, very fine.

Ma Perfection. Pure-white, very dwarf.

Mdlle. Lucie Faure. White, shaded pink, immense.

Miss Dorothy Foster. Silvery-mauve.

Miss M. A. Haggas. Primrose sport from *Mrs. Heale*.

Miss Violet Tomlin. Silvery-rose.

Mrs. R. C. Kingston. Lilac-pink, splendid flower.

Mrs. S. Coleman. Yellow shaded with rosy-bronze.

Princess of Wales. Blush-rose.

Queen of England. Blush.

Robert Petfield. Silvery-pink, one of the best.

Selection of Six Japanese Anemones.

De Devil. Crimson-rose.

Descartes. Crimson-red, high centre, dwarf habit.

Duchess of Westminster. Silvery-blush, lilac centre.

Mons. C. Debosc. Citron-yellow, tinted rose.

Robert Burns. Delicate-blush, disc creamy-yellow.

Robin Adair. Blush-white, flushed lilac; central florets pink and yellow.

Selection of Six Large Anemones.

Georges Sand. Bronze-red tipped with gold.

John Bunyan. Rich-yellow.

Madame Robert Owen. Pure-white.

Mrs. C. J. Salter. Orange-buff, self-coloured, neat.

Nelson. Crimson-purple.

Prince of Anemones. Lilac-blush.

Selection of Six Reflexed Varieties.

A. J. Banks. Primrose-yellow.

Cloth of Gold. Light-yellow, mid-season.

Cullingfordii. Crimson, florets showing gold reverse.

Dr. Sharpe. Magenta-crimson.

Felicity. Cream-white.

Phidias. Rose-blush, large, mid-season, a fine variety.

Selection of Twelve Varieties for the Open Ground.

Blushing Bride. Pompon, bright rose-lilac.

Bronze Bride. Rosy-bronze, sport from *Blushing Bride*.

Early Blush. Rosy-blush, fine habit.

Flora. Golden-yellow, free bushy habit.

Golden Drop. Golden-yellow, sport from *L'Ami Couderchet*.

Lyon. Rose-purple, one of the best.

L'Ami Couderchet. Creamy-white, dwarf.

Mr. W. Piercy. Red, changing to orange.

Mrs. Cullingford. Blush-white (pure under glass).

Piercy's Seedling. Orange-bronze, dwarf.

Precocite. Light-yellow.

Sœur Melaine. Pure-white, fine habit.

Selection of Six Single-flowered Varieties.

Framfield Beauty. Velvety-crimson, of large size.

Jane. Pure-white, narrow, pointed and twisted florets.

Mary Anderson. White, large yellow disc, one of the best.

Miss Rose. Rose-purple, very free.

Miss Annie Mumford. Orange, shaded crimson.

Purity. Pure-white, florets turned inwards at tips.

[R. D.]

Cineraria.—The Greenhouse *Cineraria* (fig. 525) has been evolved by selection and cross-breeding from *Senecio* (*Cineraria*) *cruentus*, a native of the Canary Islands. Various hybrids between this species and several others have



SNOWDROP (Pompon)



C. H. CURTIS (Incurved)



JAMES BIDENCOPE (Japanese Reflexed)



MRS. A. STUBBS (Single)

been raised in gardens, but no trace of any other species than *S. cruentus* can be found in the plants now popularly grown as Cinerarias. Named varieties are sometimes propagated by means of cuttings; generally, however, the plant is treated as an annual, the strains coming true from seeds. They can be raised in quantities, and are comparatively easy to grow if kept



Fig. 525.—Cinerarias.

free from aphides, to which they are more than ordinarily subject. These attacks nearly always follow some slight check in the growth of the plant, and by far the best way of prevention is to keep the plants in a constant state of growth, giving them plenty of water and letting them grow away freely from the first. They like moderate shade, plenty of air, and a moist atmosphere at all times, but air should not be given in a way to come directly through them in a current. They flower in the winter and spring, when their exceedingly-bright colours render them suitable conservatory decorative plants, and also for furnishing cut flowers. They do not bear much forcing, and if pushed on too freely become leggy and produce but small flowers; on the other hand, it is well not to grow them too slowly.

Seeds should not be sown before the end of April or early in May. A second sowing may be made in June for a later batch. Sow in pans in a compost of three parts good loam, two

parts leaf-mould, mixed with one-sixth sand; and sow the seeds thinly, as the seedlings when too much crowded in the seed-pan get their roots injured in potting off. Place the pans in shade, and do not water more than is requisite before the plants are up. After they have vegetated keep the soil moderately moist, and place where the seedlings will get plenty of light but little sun; when large enough to handle, prick them out in pans or pots filled with similar soil to that in which they were sown, excepting that now it will be well not to use so much sand. When the seedlings have grown so as to touch each other they should be planted singly in 4-inch pots, and moved into shallow frames facing the north or on the shady side of a wall. Give plenty of air, and from their first appearance above-ground never allow them to get dry. For most purposes 6-inch pots are large enough, if the plants are well attended to, and liberally supplied with manure-water as the pots get filled with roots. Pot moderately firm, and all they will require during the remainder of the summer will be to keep them regularly supplied with water, air, and shade, the bed of ashes on which they are stood being in hot weather always kept damp. As the autumn advances they should be removed to a pit where a little heat can be turned on. They should always be stood on a moist bottom. If set on shelves an inch of sphagnum placed under them and kept damp will be beneficial, and if in a house with side-lights, they must not be placed near where these open so as to let the air come directly on them. As soon as they show signs of forming their bloom-stems give manure-water at every alternate watering, but do not allow it to touch the leaves; this will give them strength and much increase the quantity of flower they produce. They will bloom nicely by Christmas in a temperature of from 40° to 45° at night, with a little more warmth in the day. A few of the best should be selected for seed. The blues, self-reds, and white grounds tipped with red are the principal colours. Those intended to bear seed should be placed, whilst in flower, away from the others, each colour in a small frame at some distance apart, so that they will not get crossed by bees. The seed should be gathered as soon as ripe.

C. stellata, or the Star Cineraria, is a new strain, the result of cross-fertilization between forms of *S. cruenta* and the type. The flowers are small and starry, and produced in immense numbers; the plants vary in height from 1½ to 4 feet, and form most charming subjects for

house and conservatory decoration. Other new strains have been raised in the Botanic Gardens at Kew, Cambridge, and elsewhere, by crossing several tall-growing species, such as *Heritieri* and *multiflora*, with the garden *Cineraria*, thus obtaining height of plant, a looser habit, and a larger head of flowers.

Insects.—These can be destroyed by fumigation, but the applications must be slight, or the bottom leaves are certain to suffer. A better method, yet involving a little more labour, is to keep always on hand a supply of tobacco water in a vessel sufficiently large to admit of the plants being dipped, when any are found affected. If timely means are thus taken as soon as any aphides are discovered, they are easily kept under.

Clematis.—The wild species of *Clematis* are dealt with in another part of this work. Beautiful as most of them are, they cannot be compared to the purely garden types with which we have now to deal, either in the size and brilliant colouring of the single flower, or in the showiness of the plant as a whole. They have been obtained by intercrossing *C. Viticella*, *C. patens*, *C. lanuginosa*, and *C. florida*. A new group has lately been added by Messrs. Jackman of Woking, by crossing *C. coccinea*, a North American species, with the garden varieties.

The first hybrid raised appears to have been *C. Hendersoni*, distributed in 1835, from *C. Viticella* and probably *C. integrifolia*. It is interesting now chiefly because it is one of the parents of the important *Jackmani* race. In 1850 seedlings from *C. patens* were raised at Libourne in south-west France. Shortly after, Mr. Anderson-Henry of Edinburgh crossed the same species with *C. lanuginosa*, introduced from China by Fortune a few years before. In 1858 Messrs. Jackman & Son, Woking, crossed *C. lanuginosa* with *C. Hendersoni* and a variety of *C. Viticella*, and amongst the seedlings thus obtained the famous *C. Jackmani* appeared. Other breeders of Clematises are Messrs. Simon Louis Frères of Metz, C. Noble, Cripps & Son, and R. Smith and Co. of Worcester.

Few hardy climbers provide so gorgeous a display of flowers, spread over so long a time, as the garden Clematis. In the open ground it may be trained up rough poles or trellises or massed in beds; or allowed to ramble over old tree-stumps, or roots, or rock-work. Some varieties are useful in the cool greenhouse, either planted out and trained up the rafters

or pillars, or cultivated in pots and trained on wire cages.

The soil in which the Clematis thrives best is a rich, not too heavy loam. It likes chalk or lime, and if this substance is not present the ground should be dressed with it occasionally. The Clematis is a gross feeder, and a good annual mulching of rotted manure is of great benefit. At the first planting the ground should be thoroughly trenched, and if it be of a heavy nature a good proportion of leaf-soil should be mixed with it. If light and sandy, it should be strengthened by adding stiff loam.

Pruning should be done about the end of February, when it is easier to pick out the dead portions than it is in midwinter. As a general rule the aim should be to cut out weakly, unnecessary growths, and to shorten back the others. Many varieties, if left alone, are apt to form a few bare stalks at the bottom, and a huge, top-heavy mass overhead. The *Jackmani* group may safely be cut back each year to within a few inches of the previous year's wood. For *C. lanuginosa*, and hybrids from it, less pruning is needed. The groups centring round *C. patens* and *C. florida* respectively need little or no pruning, for they flower in spring and are not so vigorous as the others.

Pot Culture.—The cultivation of Clematises in pots has been brought to a high state of perfection



Fig. 526.—Pot-grown Clematis Princess of Wales.

in recent years. The most convenient method is to grow them on into 14-inch pots, training the shoots over balloon-shaped trellises made of

wire or wood. To obtain quicker results three plants may be grown in one pot. The soil must be of a rich loamy nature and well drained. Plenty of water and frequent supplies of manure-water are necessary in the growing season. Any light, airy house where the winter temperature ranges between 40° and 50° will do for them. To obtain plants in flower by April or May they must be taken inside during January. By introducing batches at subsequent intervals a succession of flowering plants is ensured. After flowering, the plants may be taken out of doors to thoroughly ripen the growths, which is an important matter. Owing to the late date at which they flower the *Jackmani* and *Viticella* groups are not suitable for growing in this way. The *lanuginosa* group furnishes the most popular varieties, but the *patens* and *florida* groups are also suitable. The following varieties may be specially recommended for pot-culture:—

Imperatrice Eugenie, *Purpurea elegans*, Princess of Wales (fig. 526), Sensation, Madame Van Houtte, Fairy Queen, Marie Lefebvre, Belle of Woking, Venus Victrix, and Mrs. Geo. Jackman.

SELECTION OF SORTS FOR GENERAL CULTIVATION.

I.—*Patens* Group.

Blooms from May to July from the wood made the previous season. The species itself was introduced from



Fig. 527.—Clematis Beauty of Worcester.

Japan in 1836. It has bluish-lilac flowers, 5 inches to 6 inches across.

Edouard Desfossé. Deep-mauve.

Fair Rosamond. Blush-white, red bar on sepals.
Marcel Moser. French-white, pink bar.
Mrs. Geo. Jackman. White with creamy bar.



Fig. 528.—Clematis Madame Edouard André.

Sir Garnet Wolseley. Pale-blue, with plum-red bars
The Queen. Violet, 6 inches across, scented.

II.—*Florida* Group.

These flower on the wood of the previous season, but the flowers of the earliest varieties do not appear till June. The plants are on the whole less vigorous than the others; *C. florida*, the type, is a large-flowered species, brought from Japan in 1776.

Belle of Woking. Silvery-gray, double.

Countess of Lovelace. Bright bluish-lilac, anthers yellow.

John Gould Veitch. Pale-blue; from Japan in 1862.

Lucie Lemoine. White, double; anthers yellow.

Venus Victrix. Delicate-lavender, double.

III.—*Lanuginosa* Group.

The most important group. The introduction of the parent species in 1851 may be said to have been the genesis of the garden race as we know it to-day. It flowers from June to October on the growth of the current season. When grown on pillars, &c., a shortening back of some of the growths may be done, so that the lower part may not be left bare of growths and flowers

Anderson Henryi. Large creamy-white flowers.

Beauty of Worcester (fig. 527). Rich bluish-violet, 5 inches across.

Fairy Queen. Flesh-coloured, 7 to 9 inches across.

Imperatrice Eugenie. Pure-white.

Lady Caroline Nevill. French-white, with mauve bars.

La France. Deep violet-purple.

Lord Nevill. Dark plum-coloured, sepals crimped.

Purpurea elegans. Deep violet-purple.

IV.—*Jackmani* Group.

This group is noteworthy for its vigour and for its long flowering season, namely from July to October. The

flowers are borne on the current season's growth, and the plants may consequently be pruned almost back to the old wood if necessary.

Jackmani superba.—Large, dark violet-purple.

Lilacina floribunda.—Pale grayish-lilac.

Madame E. André (fig. 528).—Bright-crimson, free-flowering.

Smith's Snow-white Jackmani.—Paper-white.

Star of India.—Reddish plum-coloured, with red bars.

Velutina purpurea.—Blackish-mulberry.

V.—*Viticella* Group.

Flowering season and treatment the same as group IV.

Lady Bovill.—Flowers cupped, grayish-blue.

Madame Grange.—Crimson-violet, reddish in centre.

Mrs. Jas. Bateman.—Pale-lavender.

Thomas Moore.—Bright-magenta, stamens white.

VI.—*Coccinea* Group.

C. coccinea is a species with fleshy pitcher-shaped flowers, swollen at the base, and nearly closed at the top, the tips of the sepals recurved. Being of a scarlet or carmine colour, new shades as well as a new shape of flower have been obtained by Messrs. Jackman by crossing it with garden varieties:—

Countess of Onslow.—Violet-purple, with a red band.

Duchess of Albany.—Bright-pink and lilac.

Duchess of York.—Blush-pink.

[W. J. B.]

Clivia (fig. 529).—A South African genus of three species of free-flowering evergreen plants belonging to the Amaryllis family. They form sturdy compact masses of thick, strap-shaped leaves resembling those of the *Hippeastrum*, and a fleshy root-stock. The showy flowers are borne in large umbels on stout scapes well above the leaves, and are usually various shades of orange-red in colour. *C. miniata* far surpasses the others in beauty, and from it, by cross-breeding and selection, a useful race of greenhouse plants has been obtained. They are first-rate plants for many purposes, being equally serviceable for conservatory, house decoration, or for cutting. If placed in a cool room the cut flowers will last at least a fortnight. To have them at their best an intermediate temperature is necessary, though they are not unhappy under greenhouse culture. They do equally well when grown in pots or borders. They are excellent for large houses, where, if planted in the shade of some taller plant, they still continue to grow and flower well; but if they can be given a sunny position, where they can be rested during winter, so much the better. Being quick growers and rank feeders they must be planted in a rich compost; good loam, mixed with a fair amount of rotten manure and sand, being suitable. Plants grown in pots, and which have been

rested during winter, should be repotted in February, kept close, and syringed frequently until root-action has recommenced, and flower-spikes appear, when more air and plenty of moisture are necessary. For ordinary purposes single-crowned plants in 6-inch pots are most



Fig. 529.—*Clivia miniata*.

serviceable, but where large specimens are required a number of strong plants may be put together in 10-inch pots. Propagation is slow if done by division. Seeds are readily ripened and should be sown in heat, and the young plants pricked off in a bed of good soil in an intermediate house, where they will attain flowering size in about three years.

C. miniata.—The type has flowers 2 inches across and 3 inches long, orange-red, in umbels of from fifteen to thirty each on stout erect scapes 12 to 18 inches long; leaves sturdy, 2 feet long, straighter than in *C. Gardeni*. There are numerous named varieties, differing from the type in number, size, and shape of flowers, and intensity of colour. Var. *citrina* is a distinct variety with pale-yellow flowers and was introduced from Zululand in 1897.

C. Gardeni.—Leaves 2 feet long, deep-green, arching. Flowers pendulous, tubular, 1½ inch long, orange, tinged with red and tipped with green; in large loose heads.

C. nobilis.—A sturdy plant with wider, more upright leaves and longer flower-stems than either of the others; but the flowers are smaller, tubular, red and yellow, pendulous, and often fifty together in a loose umbel.

C. cyrtanthiflora is a garden hybrid between *C. miniata* and *C. nobilis*. The flowers are pendulous, in large heads, and intermediate in size and shape between the two parents, as also are the leaves.

Codiaeum (Croton).—The Crotons of gardens are all forms of a single species of *Codiaeum*, long cultivated as a decorative plant in the



Fig. 530.—*Codiaeum* (broad-leaved).

tropics, and first introduced into this country by Loddiges, who figured a form of it in his *Botanical Cabinet* (t. 870) under the name of *Croton pictum*. It was also figured in the *Botanical Magazine*, t. 3051 (1831), under the name of *Codiaeum pictum*. Its correct botanical name is *Codiaeum variegatum*, and it is a native of the Mollucca Islands, although now semi-wild in many parts of the tropics, where many of the cultivated varieties originated. Sir Joseph Hooker describes it as an evergreen shrub with leaves 2 to 10 inches long, very variable, from oblong to narrowly linear, often wavy, and variegated green and yellow, showing an infinite variety of form and colouring. The flowers, which are insignificant, are borne on axillary spikes or racemes, the males and females on separate spikes. They are easily crossed, and numerous seedlings have been raised artificially in this country, especially within the last fifteen years. One of the principal raisers of new varieties was the late C. F. Bause. Messrs. R. P. Ker & Sons of Liverpool have also raised many new seedlings.

Codiaeums have now become indispensable as decorative plants, playing a most important part both in the plant-stove and in artistic

groups. No one will regret the disappearance to a great extent of the huge specimens which at one time were to be seen in our stoves. These did not aid in making the genus nearly so popular as do the smaller, more elegant specimens now to be met with.

Culture.—*Codiaeums* are not difficult to cultivate. Cuttings may be struck at any season of the year in a bottom heat of 80°. It is best to strike a yearly stock late in the autumn. The growths, if taken then, are not active or sappy, hence far less check is experienced, and they root readily in a close pot or frame. The best cuttings to form single-stemmed plants are those of upright growth rather than side shoots. If, on the other hand, a larger specimen is intended, then take a stout cutting with four, five, or more shoots upon it. This will strike just as freely as a single shoot in a close pit. It is always better to choose well-coloured shoots with healthy foliage to the base of the cutting. When rooted, they should be potted in an open loamy soil and pushed on in heat. Abundance of light is essential to develop the colour in the foliage, and also induces a short-jointed, sturdy growth. Where a sufficient number of these and other light-loving plants are grown it is a good plan to so arrange them as to avoid the use of sun-blinds, save in a mini-



Fig. 531.—*Codiaeum* (narrow-leaved).

mum degree. Plants kept somewhat confined at the root are better able to support exposure to a lower temperature or a dry atmosphere,

as, for instance, when used for furnishing purposes. Liquid manure may be given. A top-dressing with an artificial compound containing bone-meal may be employed to give vigour to pot-bound plants. Plants in full vigour will take a liberal supply of water at the roots, and frequent syringing overhead, which serves to keep down insects.

Insect Pests.—For mealy bug and scale hot water is a good remedy, easy of application, using it at such a temperature as the syringe when filled can be held in the hand with tolerable comfort. A small, rather long, kind of scale is frequently found along the margins and midribs of the leaves, clinging most tenaciously, so that it can only be removed with a strong insecticide such as "XL All". Red spider does much damage if the syringe is not freely employed. For bad cases sulphur should be mixed in the water. A mite similar to that which attacks Begonias sometimes gets on to Codiaëums, causing the young leaves to drop when quite small. Saturation with sulphur and tobacco-water or soft soap will destroy this pest if carefully and frequently applied. Thrips will cause trouble in a similar way and upon the older foliage too, but the syringe and fumigation will make a clearance.

Selection of Varieties.

Broad-leaved.—Andreanum, Baron Frank Seilliere, Baron James de Rothschild, Williamsii, Thompsonii, Reidii, Veitchii.

Narrow-leaved, pendulous habit.—Angustifolium, Aigburthlense, Chelsoni, Countess, Johannis, Picturatum, Warrenii.

Narrow-leaved, semi-erect habit.—Lady Zetland, Aneitense, Weismannii, Mrs. Dorman, Ruberrimum.

Foliage of medium width, habit disposed to be erect.—Queen Victoria, Sunset, Undulatum, Sunrise, Flambeau.

Lobed-leaved.—Disraeli, Earl of Derby, Evansianum, Mortefontanense, Illustris.

Twisted-leaved.—Golden Ring, Caudatum, Tortile, Spirale.

Other Varieties.—Recurvifolium, Volutum, Van Oerstedii, Hawkerii, Flamingo.

[J. H.]

Coleus.—Although popularly supposed to be of hybrid origin, the numerous forms of garden Coleuses are the progeny of *C. Blumei* (fig. 532), a native of Java, where it was long cultivated as a garden plant before its introduction into Belgium about fifty years ago. Forms of it have been named *C. Verschaffeltii*, *C. Gibsoni*, *C. Veitchii*, &c. In 1867 a batch of new seedlings, obtained, it is said, by crossing these three forms, was raised at Chiswick. The plants seed freely, and from these numerous forms are easily raised. There are now many named varieties,

amongst which we have all the shades of red from pale-pink up to the deepest crimson, and green from the faintest to dark-olive, combined with yellow—these variously blended, from varieties that have half their leaves yellow and the other part crimson, to those that are spotted and edged in the most regular manner. In the conservatory they are very effective and useful



Fig. 532.—*Coleus Blumei*.

in the summer. They are quick growers, very easy to increase, and are best propagated every year from cuttings taken in March from a plant or so of each kind, preserved through the winter in a warm house with a minimum temperature of 55°. Insert the cuttings in thumb-pots in sandy loam, place them where they will have a night temperature of 60°, and keep them moist and shaded from the sun. In a fortnight or three weeks they will have rooted, when they may be moved into 6-inch pots, using ordinary loamy compost with a moderate quantity of sand. Keep them in a sunny position near the glass, and pinch out the points to induce a bushy habit. They should be well syringed overhead at least once a day, preferably in the afternoon. In the course of a month they may be repotted into larger pots according to the size to which it is intended to grow the plants. For general

purposes 8-inch pots are large enough, but large specimens require 12-inch pots. In June give them more air and less heat for a week or two before removing them to the conservatory or greenhouse, where they will do well until October, when they may be destroyed, retaining only sufficient to afford a supply of cuttings in the succeeding spring.

They are little subject to insects, although red spider will sometimes attack them if the atmosphere in which they are grown is kept too dry.

Crocus.—The Crocus is one of the earliest, hardiest, and brightest in colour of all spring-flowering bulbs, and the Dutch roots are so cheap by the thousand that they should be planted largely in all good gardens. The genus contains in all seventy or more species distributed wild over Europe, North Africa, and North and Western Asia. Mr. George Maw's beautiful *Monograph of the Genus Crocus* may be consulted by all interested in the history of the rarer kinds. Our native species, *C. vernus*, is the most variable, and the origin of most of the purplish-coloured Dutch seedlings—the golden varieties being derived from *C. aureus*. These two yield the best of the spring-blooming kinds, the most showy autumnal kind being the blue *C. pulchellus*.

Their cultivation is very simple, as they thrive in nearly all soils, although preferring light loam, or even sand or gravel. The corms or bulbs should not be planted more than 3 inches deep or they are apt to damp and rot away on stiff, wet soils. The bulbs may be grown in pots or boxes planted in sandy soil or in wood-moss and leaf-mould; they flower very early if sheltered in a sunny frame. Some of the most fragile of the autumnal kinds suffer so much from cold rains and rough gales that they are rarely seen to the best advantage unless sheltered in cold pits or frames. All are easily grown in pots in a sunny window, and there are few more cheerful sights than a pot or two of Crocus opening to the sunshine of a wintry morning.

Species of Crocus.

C. aureus.—The harbinger of spring flowers; vivid orange-yellow. May be grown anywhere. South-eastern Europe.

C. biflorus.—Scotch Crocus. Flowers white or pale-lilac, very variable. *C. Weldenii* and others are forms of this species. Tuscany to Georgia.

C. chrysanthus.—Yellow-flowered. There are three or four named forms, such as *albidus*, *fusco-tinctus* and

fusco-lineatus, *carulescens*, &c. Very free and early. South-eastern Europe.

C. hadriaticus (fig. 533).—Leaves and flowers produced together, the latter white tinged with yellow at base in-



Fig. 533.—*Crocus hadriaticus*.

side, with brown outside; stigmata orange. October. Albania, &c.

C. Imperati.—Neapolitan Crocus. The earliest to bloom in January out-of-doors. Flowers lilac or purple, fawn-coloured, and striped behind and in bud. There is a white variety, very free and hardy. Naples.

C. iridiflorus.—Iris-flowered, autumnal, three of the segments broader than the others. Colour lilac or purple. Transylvania.

C. medius.—Flowers bright mauve-purple striped at base of inner segments; stigmata conspicuous, bright-orange. October. Maritime Alps.

C. nudiflorus.—Autumnal Nottingham Crocus, being formerly found in meadows there along with the spring-flowering *C. vernus*. Flowers purple or violet. South-western Europe.

C. pulchellus.—Flowers bright-lilac, large as in *speciosus*, but with a yellow eye and much less conspicuously striped. October. Asia Minor.

C. reticulatus.—An early and pretty spring-flowering species with flowers varying from white to purple, but always striped with purple on the three outer segments. Anthers orange; stigma scarlet. Caucasus.

C. sativus.—Saffron Crocus. One of the oldest of cultivated plants, mentioned by Solomon. Formerly much grown at Saffron-Walden and elsewhere in England. Flowers violet-purple in autumn. There are many varieties. Italy to Kurdistan.

C. Sieberi.—Perianth lilac-purple with an orange throat, stigma vivid orange-scarlet. March. Greece.

C. speciosus (fig. 534).—Best autumnal kind. Flowers blue-purple with orange stigmas, very free and hardy. Bosphorus.

C. Susianus (Cloth-of-Gold Crocus).—A well-known old garden plant, flowering in February, its buds heavily striped with dark purplish-brown, also called *C. revolutus*, as its three outer segments often reflex with age. Very early, bright, and showy. Crimea, Persia, Caucasus.

C. vernus.—Spring Blue or Purple Crocus, of all colours except yellow. Very hardy and showy. Europe.

C. versicolor.—Parti-coloured Crocus, one of the oldest

fer, Amazone, Van Speyk, Lady Stanhope, La Majesteuse, Sir Walter Scott, Madame Nina Margot.

Blue or Purple.—Argus, Baron von Brunow, David Rizzio, Grand Vedette, Non-plus-ultra, Prince Albert, Rembrandt, *Purpurea grandiflora*.

[F. W. B.]



Fig. 534.—*Crocus speciosus*.

of garden plants, and most variable, yielding all sorts of lilac, purple, and striped forms from seed. Maritime Alps.

C. zonatus (fig. 535).—Like *pulchellus*, but with a dis-



Fig. 535.—*Crocus zonatus*.

tinctly marked yellow ring near base of cup and with a smaller stigmata. September. Asia Minor.

Best Dutch or Garden Sorts.

Yellow.—Giant Golden (selected), Common Yellow, Cloth of Gold.

White.—Caroline Chisholm, Grootvorst, Jeanne d'Arc, Josephine, Mont Blanc, Mammoth, Queen Victoria, Snow Queen, La Noblesse, Reine Blanche, Grand Vainqueur, Diamond.

Variegated.—Albion, Comtesse de Marny, Ida Pfeif-

Cyclamen (*Cyclamen latifolium*).—Although popularly known as the Persian Cyclamen, this race of garden plants has been bred from *C. latifolium*, a native of Greece and Syria. It was introduced into cultivation through Ghent about 150 years ago, by means of a small, white-flowered form with a purple base. Varieties were known in gardens a century ago, but the development of the large-flowered, rich-coloured varieties has taken place within the past forty years.

There is no plant of moderate size that, when well managed, contributes so much to a floral display through the winter and early spring, as the Cyclamen. It comes true from seed in innumerable shades of colour, varying from the purest white to crimson and purple. The seeds should be sown in November in an ordinary seed-pan in a mixture of fine loam, leaf-mould, and a little sand, slightly covering the seeds, and placing them in a temperature of 60°, in a light position to prevent the seedlings from being drawn. When large enough to handle, pot them singly into thumb-pots, and in the spring repot into 60-sized pots, shading during bright weather. By midsummer they will have filled their pots with roots, and should at once be moved into 5-inch pots. In potting do not more than half-cover the corms with soil. Place the plants in a low house or pit, and shade them in bright weather. Give plenty of air, and attend to them with water regularly, syringing overhead in the afternoons; this will help to keep down thrips, red spider, and green-fly, which must be kept under or the leaves will be crippled and destroyed. The long, low, narrow span-roofed structures, with a sunk path down the centre, and a bed of earth covered with ashes on each side, raised well up to the light, that are so much used by market-gardeners, grow this and many other plants well. In winter give plenty of air, and keep the temperature from 45° to 50°. They will flower beautifully from November to the end of February, or even longer if not allowed to seed. Some of the finest displays of Cyclamen have been made early in November by Messrs. Sutton & Sons, who sow during the first week in November, and have their plants in full flower and fit for exhibition

twelve months afterwards. When the plants have finished flowering they should be placed in a pit where they can be shaded. They will



Fig. 536.—*Cyclamen persicum* "Papilio".

soon show signs of resting by ceasing to make leaves, when they require less water. In the autumn they should be started again by shaking them out of the old soil and repotting in pots of convenient size. The subsequent treatment should be that already detailed. These second-year corms will flower earlier and more freely, but the blooms may not be quite so large as first-year plants. It is not advisable to keep them after the third season.

There are now some very fine strains, remarkable for the size and shape of the flowers and an extraordinary variety of colour. Two of the most recent acquisitions are a crested variety raised by Messrs. Hugh Low & Co., and which is remarkable in having a raised feather-like crest on the petals; and the *Papilio Cyclamen* (fig. 536), of Continental origin, which differs from the type in having more or less fringed petals, spreading horizontally, wing-like. Both of these forms come fairly true from seeds.

Dahlia.—Introduced into England from Mexico in 1789 by the Marchioness of Bute, who brought it from Spain. The form, size, and colours of the flowers have been so much improved that we now have almost every shade of red, white, yellow, and purple, as well as an infinite variety of mixtures of these colours.

There are five well-marked groups or sections of Dahlia, viz. Show, Fancy, Pompon, Cactus, and Single, although until a few years ago only two were recognized, namely, Show and Fancy. They were distinguished somewhat

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arbitrarily, Shows being white or yellow varieties, edged, tipped, or laced with a dark colour, after the manner of the Picotee; but when the disposition of colours was reversed, and the florets of a dark colour tipped with a lighter shade, or with Carnation-like stripes, they were called Fancies. The two classes are now generally merged in one, and known as Show varieties.

Single Dahlias (fig. 537).—These are slight variations of the wild type, reintroduced some twenty years ago, when it achieved a remarkable popularity, a large number of new varieties being soon raised from it. Beautiful as they are, and so well adapted for floral decorations, the fleeting character of their blossoms is against their use in this way—the petals quickly falling unless the blooms are gathered quite young. A race of dwarf varieties, known as Tom Thumb, originated with the late Mr. T. W. Girdlestone, who also enriched collections with many beauti-



Fig. 537.—Single Dahlias.

ful seedlings, possessing delightful combinations of colour.

Cactus Dahlias (fig. 538).—This is the most popular section of Dahlias. They are derived from *Dahlia Juarezi*, a crimson-flowered species. The section takes its name from an imagined likeness to the bloom of a Cactus. By crossing

it with others akin to it, numerous varieties bearing the peculiar Cactus-like character, and varying considerably in colours and combina-



Fig. 538.—Cactus Dahlias.

tions of shades, have been raised. The first seedlings were of tall growth, with few flowers, which were hidden by the foliage. The newer varieties are comparatively dwarf, free-blooming, and in not a few cases throw their flowers well above the foliage. Some of them, however, bloom somewhat sparingly, and for them no thinning of the shoots should be attempted.

Single Cactus, a recent development, comprises single forms of the Cactus type, with quilled and pointed petals; they are likely to gain general favour, being dwarf and very free of bloom.

Pompon Liliputian Dahlias (fig. 539).—These originated in Germany in the early part of the present century as a sport from *D. coccinea*. At first of tall growth and flowering sparingly, they have been greatly improved, being generally of fairly dwarf habit, and remarkably free of bloom. The flowers are small, symmetrical, borne on long, stiff, erect stems, and of variable colours. For garden decoration they are unsurpassed; they are also popular as exhibition flowers.

Decorative Dahlias.—This group consists of

free-blooming varieties of an intermediate and mixed character, and which are much employed for general garden purposes, though likely to be superseded by, if they do not entirely disappear in favour of, the greatly improved Cactus section.

Bedding Dahlias.—Under this name we have a group of dwarf, free-blooming varieties of the Show type, selected for their stiff, erect habit, and great wealth of bloom. They, with the Single Tom Thumb varieties, are useful to plant as an outside row in large beds of the taller-growing types.

Propagation.—The Dahlia is propagated by seeds, cuttings, division of the roots, or occasionally by grafting. The seeds may be sown in the end of March or the beginning of April, in pans filled with light rich soil, and placed in a bottom-heat of about 60°. A dung frame with a moist heat is invariably used by the raisers of seedling Dahlias. When the seedlings are about 2 inches high they should be pricked out in small pots, gradually hardened off in May, and planted out in the beginning of June. Cuttings are obtained from the roots,



Fig. 539.—Pompon Dahlias.

which, having been kept through the winter, are placed in moist heat in a little light soil such as leaf-mould, either under a stage in a

warm house, or on a hot-bed, in February or March, at a temperature of about 60°. Shoots are soon sent up from about the crown, the first of which, being stout and hollow, are thrown aside, those that follow being more solid. They are planted singly in thumb-pots or round the sides of large 60-pots, in a sandy mixture, and placed in a close frame or pit in a temperature of 60° to 70°. The earliest cuttings take four or five weeks to root; those taken later will root in about half the time. When rooted they are repotted and returned to the frame until they are established, when they are hardened off and placed in a cold frame. They will not stand frost. It is well to pot the plants into 4- or 5-inch pots to get them well rooted for planting out in the open the first week in June.

Division of the tuber-like or fleshy root is chiefly practised where only a few strong plants are required. In this case place the roots in heat in March or April, and when the buds at the crown push, divide into as many parts as is necessary, preserving at least one bud to each piece, keeping them in a greenhouse or cold frame till the time of planting out.

Soil.—The Dahlia, to produce its flowers in perfection, requires a well-drained soil which is neither very light nor of a strong adhesive nature. Any good fresh loam will do exceedingly well. The ground should be prepared by deep trenching in winter, and if it is naturally poor, some turfy loam and well-decomposed cow-dung, or old hot-bed manure, may be mixed with the soil at the time of planting.

Planting.—Any open situation, not shaded by trees, will suit the Dahlia. The taller varieties may be planted with good effect on each side of a walk, or in front of shrubbery borders. They also have a brilliant appearance when planted in masses. The dwarf varieties may be used for bedding in the flower-garden, where they are either allowed to pursue their natural mode of growth or are pegged down. For decorative purposes those only should be grown which are of rich and effective colours, and throw out their flower-heads on long stalks clear of the foliage. In the first week of June the plants may be put out in the open ground. It is the general practice to make a hole 18 inches in depth; place a spadeful of good manure at the bottom of it, mixing with it some of the soil taken from the hole, and then planting, but a little deeper than the plant was in the pot. If the weather be warm and dry a good watering may be given, and be repeated

twice a week if drying weather continues. To keep the soil cool and moist about the roots a mulch of good manure is placed upon the surface after the plants start into vigorous growth. At the time of planting it is usual to stake the main shoot, tying it securely, but allowing space for it to swell. Vigorous-growing varieties will require their side-shoots staked also, or they will be stripped off by wind. Syringing or watering overhead in the evenings of warm days is of great assistance to the plants, and in hot drying weather copious waterings at the roots is also necessary.

Plants grown for the production of exhibition blooms should have their shoots thinned if necessary, but where there is a tendency to large size and coarseness thinning should be sparingly done. A knowledge of the habit of the plant is necessary in this case. Plants put out in borders for decorative purposes should be thinned out only enough to permit light and air to reach the centres of the plants. Flowers of light shade intended for exhibition require to be protected from bright sunshine and storm. Liquid manure may be given with advantage to some varieties when the buds are swelling, but care is requisite, as an indiscriminate use of a strong stimulant may lead to the production of coarse flowers.

The earwig is a most troublesome pest to the growers of Dahlias, preying upon the young shoots early in the season, and later on injuring the buds and flowers by eating holes into the petals. The old-fashioned plan of inverting a flower-pot with some moss in it on the top of the main stake is still one of the best methods of trapping them. Slugs can be trapped by placing Lettuce or Cabbage leaves on the soil near the plants. Green-fly will infest the shoots of the plants in warm, dry weather, but constant waterings overhead by night will keep this pest in check; if not, then the points of the shoots infested should be washed in some insecticide, such as 4 ounces of soft soap dissolved in a gallon of boiling water, applying it when cool enough.

As soon as autumn frosts destroy the foliage the stem of the plant may be cut away and the roots dug up, turning them upside down so that water may drain away from the hollow stem. Each root should be carefully labelled, superfluous soil removed from the tubers with a pointed stick, and then stored away in a dry, cool, frost-proof place, beneath the stage of a greenhouse being their usual wintering quarters.

The following lists comprise a selection of the best sorts in each section:—

Show.

Arthur Ocock. Orange-red.
Buttercup. Yellow, edged red.
Chieftain. Purplish-lilac.
Colonist. Chocolate and fawn.
Duchess of York. Lemon, edged salmon.
Florence Tranter. White, edged purple.
Goldfinder. Yellow, tipped red.
Harrison Weir. Clear-yellow.
Hon. Mrs. P. Wyndham. Yellow, edged purple.
John Hickling. Yellow.
John Walker. White.
J. T. West. Yellow, tipped purple.
Kathleen. Blush-rose.
Maud Fellowes. White and purple.
Miss Cannell. White, edged purple.
Mrs. Gladstone. Soft-pink.
Muriel Hobbs. Soft-yellow.
Nubian. Deep-crimson.
Prince of Denmark. Dark-maroon.
Richard Dean. Purple.
Shottesham Hero. White, tipped rose.
William Powell. Primrose.
William Rawlings. Crimson-purple
Willie Garrett. Bright-cardinal.

Fancy.

Carnation. White, flaked rosy-purple.
Chorister. Fawn, striped with rose.
Comedian. Orange, crimson, and white.
Dazzler. Yellow, striped scarlet.
Duchess of Albany. Orange, crimson stripes.
Emin Pasha. Yellow, striped crimson.
Frank Pearce. Rose, striped crimson.
Gaiety. Yellow, striped red.
Goldfinch. Yellow, striped purple.
Goldsmith. Yellow, edged crimson.
James O'Brien. Yellow, striped crimson and rose.
Lottie Eckford. White, striped purple.
Matthew Campbell. Apricot, striped crimson.
Mrs. John Downie. Orange, striped scarlet.
Mrs. N. Halls. Scarlet, tipped white.
Mrs. Saunders. Yellow, tipped white.
Peacock. Purple-maroon, tipped white.
Pelican. White, striped with purple.
Prince Henry. Lilac, purple stripes.
Professor Fawcett. Lilac, striped chocolate.
Rebecca. Lilac, striped crimson.
Rev. J. B. M. Camm. Yellow, flaked red.
S. Mortimer. Rose, striped crimson.
W. G. Head. Dark, striped crimson.

Cactus.

Alfred Vasey. Rose, amber, and pink.
Arachne. White, banded with crimson.
Britannia. Salmon-pink and apricot.
Capstan. Brick-red and apricot.
Charles Woodbridge. Brilliant-crimson.
Countess of Lonsdale. Apricot and carmine.
Emperor. Plum-purple.
Falka. Carmine-pink.
Fantasy. Bright brick-red.
Fusilier. Coral-pink.
Island Queen. Pale-mauve, distinct.

J. F. Hudson. Reddish-carmine and yellow.
Keynes' White. Ivory-white.
Lucius. Deep-orange.
Magnificent. Salmon and apricot.
Mayor Tuppeny. Red and gold.
Miss A. Nightingale. Yellow, edged scarlet.
Mr. J. J. Crowe. Soft-yellow.
Night. Dark-maroon.
Radiance. Orange-scarlet.
Star-fish. Coral-red.
Stella. Brilliant-crimson.
The Clown. Carmine, tipped white.
Viscountess Sherbrooke. Terra-cotta and apricot.

Pompon.

Admiration. Crimson, tipped white.
Bacchus. Crimson-scarlet.
Captain Boyton. Maroon.
Crimson Beauty. Crimson.
Donovan. White, tipped mauve.
Dora. Yellow and white.
Dr. Jim. Pale ground, edged rosy purple.
Emily Hopper. Clear-yellow.
Ganymede. Amber and lilac.
George Brinckman. White.
Hypatia. Amber, fawn, and lemon.
Isabel. Orange-scarlet.
Janet. Salmon.
Lady Blanche. White, distinct shape.
Lilian. Primrose, edged peach.
Midnight. Deep-crimson.
Nellie Broomhead. Mauve on a lighter ground.
Nerissa. Rose and white.
Red Indian. Coral-red.
Sunny Daybreak. Apricot, edged rosy-red.
Tommy Keith. Cardinal, tipped white.
Vivid. Orange-scarlet.
Whisper. Yellow, edged bronze.
White Aster. White, quilled.

Single.

Dearest. White, margined with yellow.
Donna Casilda. Orange and dark-maroon.
Duchess of Albany. Mauve and pale-buff.
Florrie Fisher. Deep-mauve, white ring.
Gulielma. Pure-white, margined golden-buff.
Marion Hood. White and rosy-pink.
Miss Glasscock. Clear-lavender and pale-mauve.
Miss Ramsbottom. Pink, shaded cerise.
Miss Roberts. Clear soft-yellow.
Naomi Tighe. Satiny sulphur-yellow.
Princess Petula. Lemon, flaked with purple.
The Bride. Snow-white.

Single Cactus.

Althea. Glowing crimson.
Argyle. Deep crimson-maroon.
Bruce. Pale-lemon.
Guy Mannering. Creamy-white and sulphur.
Ivanhoe. Bright rose and crimson.
Lochiel. Cinnabar-red.
Marguerite. Pure-white.
Meg Merrilees. Clear-yellow.
Novar. Crimson-purple and magenta.
Queen Mary. White with yellow disk.
Rob Roy. Purple, violet shaded.
Sir Walter. Rosy-pink and deep-orange.

[R. D.]

Delphinium (fig. 540).—This really superb hardy herbaceous perennial, which has long been a favourite border flower, has been bred from *D. formosum* and possibly *D. Hendersoni* and one or two others. The blossoms of some of the single and double varieties are of great size; the



Fig. 540.—Delphiniums.

flowers are thickly set on the spikes, which are generally of considerable length and very symmetrical. The varieties, both single and double, vary in height; some being comparatively dwarf, others attaining a height of 6 or 8 feet and even more when the plants are well established. They are striking objects in the back row of a mixed border, or in a bed on a lawn. They flower vigorously in June and July, but their season may be prolonged by cutting out the flower-stems as soon as the flowers are over, which induces them to push up fresh spikes to flower in August and September. Seedling plants will flower even later. There is every shade of blue in their flowers, and some have white eye-like centres, some black, others brown or bronze. In some of the newer varieties there is a tinge of red.

Cultivation.—The Delphinium needs a good deep, rich, mellow, loamy soil, well manured; and in cases where it is planted out for permanent service the roots should be lifted every two years at least, about the month of November, and replanted after the soil has been deeply dug and well manured. The position should

be a sunny and open one. The plants should be mulched during summer, and be plentifully watered during periods of drought. Slugs and snails are often troublesome; they may be prevented from doing much mischief in winter by covering the clumps with coal-ashes.

Propagation.—This is done by division and seeds. The former method must be relied upon when particular varieties have to be increased. The best plan is to cut down the plants in July, and when they commence to grow again the young shoots should be cut off with a little root attached. These should be potted singly in small pots and placed in a cold frame, and by the spring they will make good plants. The seeds are often slow to germinate, some of the sorts lying in the ground a whole year before growing. They should be sown as soon as ripe, in shallow boxes in a cold frame, and when large enough the seedlings may be planted out on a warm border. Seeds from a good strain, such as that of Messrs. Kelway of Langport, yield a large proportion of good forms. There are many named varieties, new ones being added annually.

Dracæna.—The garden representatives of this genus consist of four distinct groups, two of which are not Dracænas, but Cordylines. These groups are typified by: (1) *D. fragrans* (*Lindenii*), an unbranched, sturdy plant with broad recurved leaves; (2) *D. Godseffiana* (fig. 541), a slender-stemmed, copiously-branched shrub with ovate, spotted leaves, suggesting the common Aucuba; (3) *D. australis* and *gracilis*, which are Cordylines; and (4) *D. terminalis* and its numerous progeny, also Cordylines. The last of these four groups is by far the most important in a garden sense. The type, *D. terminalis*, was introduced from the East over a century ago, and since then numerous varieties of tropical origin have been obtained from different parts of the Old World. The most valuable additions, however, are due to the skill of the late Mr. Bause, who, about thirty years ago, obtained a batch of seedlings by crossing some of the most distinct of the varieties then in cultivation. He also showed, by his clever cultivation, that they might be grown into truly gorgeous specimens. These plants are easily propagated from sections of the woody stem laid in light soil and kept hot and close, or they may be made to push out lateral shoots by cutting off their tops and keeping the plants dry for a few weeks. These shoots soon root in a tropical propagating-frame. To grow them into well-leaved speci-

mens the young plants must not be allowed to get a check, but potted on frequently into a

coloured green and cream-yellow. It is largely grown for table decoration. *D. Goldieana*, also from west tropical Africa, is an anomalous species with broad, zebra-marked leaves. It thrives under the treatment described above.

The following is a list of the best sorts:—

Baptistii
Bausei.
Beali.
Cooperi.
Doucettii.
Gladstonei.
Godseffiana.
Goldieana.
Ignea.
Jamesii.
Laingii.

Lindeni.
Lord Wolseley.
Massangeana.
Mrs. Wills.
Norwoodensis.
Princess Charles
of Denmark.
Sanderiana.
Shepherdii.
Terminalis.



Fig. 541.—*Dracena Godseffiana*.

rich compost—loam, peat, and dried cow-manure in equal parts with sand being suitable. They should not be potted firmly. A position near the glass in a hot, sunny, moist house is best for them. Here they should be syringed overhead at least twice a day, and in the afternoon the house should be closed early to catch the last of the sun's heat. They must be shaded from bright sunshine. Thrips and spiders only attack them when the conditions are not exactly suitable. With this treatment it is possible to grow, in eighteen months, plants 6 or 8 feet high with healthy leaves down to the pot, and the upper ones richly coloured. For ordinary decoration less liberal treatment is requisite; the pots may be smaller, and the soil pressed in firmly, but unless the plants are kept regularly moist and clean they are certain to lose their lower leaves.

The group represented by *D. australis* will be dealt with elsewhere. The other two groups, which are true *Dracenas* although so different in habit and foliage, require the cultural treatment detailed above. *D. Godseffiana* is a useful decorative plant of recent introduction from West Tropical Africa. Another pretty plant from the same region is *D. Sanderiana* (fig. 542), which has comparatively short, elegant leaves

are of slow growth, and not at all difficult to

Epiphyllum.—There are three species of *Epiphyllum*, two of which, *E. truncatum* (fig. 543) and *E. Russellianum*, have long been in cultivation. They are the parents of the numerous varieties grown in gardens. They



Fig. 542.—*Dracena Sanderiana*.

manage; they do not occupy much room, and are alike suitable for large or small houses. In

the winter and early spring their beautiful purple, scarlet, and crimson shaded flowers are most effective either on the plants or in floral decorations. They are usually grown grafted on *Pereskia aculeata* in the form of a small standard. The stocks are raised from cuttings



Fig. 543.—*Epiphyllum truncatum*.

in winter or spring, and are grown on in sandy loam. They should be kept to a single stem, and, when about 1 foot or 18 inches high, grafted with small pieces of the *Epiphyllum*, and kept in a close, warm frame until they are united. They should then be grown on in a warm house until autumn, when they ought to have less warmth and moisture for a time, so as to get a rest, starting them again in February. By the end of July in the second season they should be nice plants, and if they are then exposed to direct sunshine in an airy house, so as to ripen the growth, they will flower freely. In winter they require no more water than is necessary to keep them from shrivelling, and a minimum temperature of 45°. The first batch of plants should be started in February in a temperature of 60°, giving enough moisture to keep the roots in a growing state; they will soon flower, when they can be moved into a cooler situation and another batch started. Thus treated they will last for many years, increasing in size and producing annually a great quantity of their very attractive blossoms.

Plants grown from cuttings put in during the early winter, and struck in heat, should, when rooted, be placed in 3-inch pots, and grown on as directed for the grafted ones. The principal objection to these struck plants is

that from their drooping habit they soon grow too much over the pot to be seen to advantage. They may, however, be grown in baskets suspended in a warm house. Very handsome examples of basket-grown *Epiphyllums* are a feature in the large conservatory at Chatsworth.

Epiphyllums are subject to the attacks of scale and bug, which must be removed by sponging. Green-fly sometimes attacks the young flower-buds; it can be destroyed with tobacco smoke.

E. Russellianum has small thin joints, a winged ovary, regular petals, few stamens, and a short stigma. It has had less influence in the production of the garden race of *Epiphyllums* than the sturdier *E. truncatum*, which has a smooth ovary, irregular petals, and a long, slender stigma. The new addition is *E. Gaertneri*, which has joints 3 inches long, gray-green, with tufts of blackish hairs in the ends, and clusters of large regular orange-red flowers 3 inches wide, composed of about twenty spreading petals. It was introduced from Brazil in 1884. A variety of it called *Makoyanum* has less hairy joints, and flowers of a different shade from the type.

Erica.—Although there is a general family resemblance to each other in the large number of species which constitute this genus, there is, at the same time, considerable diversity in the size and form of the blossoms. This is especially true of the South African species, and the many garden hybrids raised from them. Most of the kinds flower from March to the end of August, a few being earlier or later, whilst several, such as *E. cerinthoides*, are in flower almost all the year round. Such early sorts as *caffra*, *gracilis*, *hyemalis*, *melanthera*, *persoluta*, *Willmorei*, and *Sindryana*, bloom in the first months of the year. Some, such as *E. depressa*, last in bloom for about two months.

Most of those grown in greenhouses are of a more or less compact bushy habit; some, like *E. vestita*, with stout erect branches covered with comparatively long leaves, have the appearance of a miniature erect-growing Pine; others, like *E. cerinthoides*, are almost procumbent, the long loose straggling shoots requiring some support. *Ericas* are essentially light-loving plants, and cannot bear a close atmosphere, or to stand too crowded together. For flowering in winter and spring *E. hyemalis* (fig. 544) and its allies play a very important part, the demand for them being so great that immense quantities are grown yearly in nurseries near London.

Propagation.—Heaths cross freely, and numer-

ous hybrids have been raised in gardens. They are easily raised from seed, but it takes a good many years to obtain flowering specimens in this way. The seeds should be sown in pots of fine sandy peat in a greenhouse, early in the spring, and covered with a pane of glass, keeping the soil moist by periodically partially



Fig. 544.—*Erica hyemalis*.

dipping the pots in water. As soon as the young plants are large enough to handle, pot them off singly in thumb-pots, keeping them close and shaded from bright sunshine until they commence to grow; then gradually inure them to more light and air. Nip out the points early, so as to cause them to throw out side-shoots, and the following spring move them into pots a size larger, and treat as hereafter advised for plants struck from cuttings.

Cuttings.—These should be formed of the ends of half-ripened lateral shoots. The soft-wooded kinds that make early growth should be propagated in the spring. The cutting-pots should be filled two-thirds full of crocks, over these a layer of fine sandy peat surfaced with silver sand. The cuttings should be planted $\frac{1}{2}$ inch deep, putting them in moderately close; water gently, so as to settle the sand about them; cover with bell-glasses, and place in a temperature of 60°; wipe the glasses daily, and directly any sign of mould appears on any of

the cuttings remove it or it will quickly spread over all that are in the pot. Do not allow the sand ever to become dry.

The hard-wooded varieties commence growing later than the softer kinds, and the summer is considerably advanced before their cuttings are fit to put in. Treat them as advised for the soft-wooded sorts. In the spring following, pot them singly in thumb-pots, and keep the atmosphere about them somewhat moist and confined. Stop the points, to induce a bushy habit and to lay the foundation for the future specimen. Their progress is slow in the first stages of their existence, but do not allow them to become pot-bound before shifting them into larger pots.

Soil.—Heaths require to be potted in peat of a harder or softer character, according to the nature of the variety; hard-wooded, slow-growing kinds requiring the soil to be of a closer, harder description than the soft-wooded, quicker-growing sorts. A mixture of two-thirds of heather peat with one of a softer nature will be found the best for these varieties, and equal quantities of each for the softer-wooded kinds. Good clean silver sand must be added, sufficient to keep the soil open and porous, without which fine-rooted plants of the nature of Heaths cannot exist. The shift should be in proportion to the state of the roots and the nature of the variety. The slow-growing kinds do not require so much pot-room as the freer-growing soft-wooded sorts. Heaths may be potted at any season of the year, but the autumn or early in the spring are the most suitable seasons. The new soil should be made as firm as the old ball, or the water will escape without soaking the whole. After potting, the plants should have less air until the roots get hold of the new material. After flowering, the shoots of the softer-wooded sorts, *E. hyemalis*, *gracilis*, *candidissima*, *mammosa*, &c., should be cut back to within a few inches of the base of the shoot, keeping the plants on the dry side until new growth has started, when the roots may be examined, repotting if necessary.

Watering is a most important operation in the cultivation of these plants. They should never be watered until the soil has got sufficiently dry to need it. This operation can only be satisfactorily performed by one who has had a season's experience in the management of Heaths.

House.—The house best adapted for growing Heaths is a low span-roofed one, standing north and south. No plants cultivated under glass

are greater lovers of light than these. Shading should only be used whilst the plants are in flower. They require air in abundance at all times of the year, a confined atmosphere being most injurious to them, especially during active growth. Both side and top ventilators should be freely used, at the same time avoiding strong rushes of air or cold winds. Except in severely cold weather, the ventilators should never be closed. Heaths are liable to attacks of mildew, usually an indication of too close an atmosphere. It should be cured by dusting the parts affected with flowers of sulphur, and affording more air. They dislike fire-heat; they will bear anything short of actual frost, although it is not advisable to subject them for long to a temperature lower than from 36° to 40° during the winter. Fire-heat should therefore never be used in the Heath-house unless there is actual frost, or in very damp winter weather, when it may sometimes be advisable to turn a little on early in the day to dry the air.

Plants in 5-inch pots and upwards may be placed in the open air from June until there is danger of frost. They grow freely during the summer, and are much healthier in every way when placed outside than when kept under glass.

S. = Soft-wooded.

H. = Hard-wooded.

E. æmula. Dwarf; flowers in whorls, olive and red. H.
E. affinis. Dwarf, sturdy; flowers lemon-coloured. S.
E. Aitoniana. Free, slender growth; flowers white. H.
E. ampullacea. Flowers waxy, inflated, white. There are several varieties. H.

E. aristata superba. Dwarf; flowers red and white. H.
E. Austiniana. A compact bush; flowers red, free. H.
E. Bergiana. Small bush, purplish flowers. H.
E. Bowieana. Erect; flowers white, tubular, in whorls. S.
E. caffra. Dwarf, compact; flowers globose, white. S.
E. campanulata. Flowers pendent, bell-shaped, yellow. S.
E. candidissima. Dwarf, white bell-shaped flowers. S.
E. Candolleana. Profuse flowerer, white, tinted with pale-pink. H.

E. Cavendishiana. Strong free growth; leaves deep-green, flowers yellow. S.

E. cerinthoides. Shoots long, straggling; flowers crimson. S.

E. colorans. Leaves scattered; flowers clustered, club-shaped, white and rose. S.

E. depressa. Dwarf, dense; shoots drooping, flowers yellow. S.

E. Devoniana. Dwarf; flowers red-and-black. H.

E. eximia superba. Compact; flowers green and red. H.

E. exquisita. Flowers large, waxy, deep-pink. H.

E. Fairriana. Compact; flowers numerous, rose-red. June to August. H.

E. ferruginea superba. Free; flowers flame-red. H.

E. florida. Erect; flowers white, small, profuse. S.

E. gracilis. Free, bushy; flowers small, globular, bright-red. S.

E. grandinosa. A loose, low bush, small leaves, white globular flowers. S.

E. hyemalis. Very free, upright; flowers white and rosy-pink; winter; grown in immense quantities for decorative purposes. S.

E. intermedia. Tall stiff stems, tubular white flowers. S.

E. Irbyana. Large and free; flowers pink. H.

E. jasmijniflora. Free; waxy tubular white flowers. H.

E. Lindleyana. Free; flowers long, red, with olive-yellow tips. H.

E. mammosa. Free, bushy; flowers tubular, clustered, blood-red. S.

E. Marnockiana. Flowers crimson and white. H.

E. Massoni major. Habit upright; flowers large, in whorls, red and yellow. H.

E. melanthera. Free, bushy; flowers globular, pink with black anthers. S.

E. metulæflora (fig.

545). Flowers erect, rose-pink. H.

E. mutabilis. Free flowering, bright-red. S.

E. obbata. Free; flowers in whorls, waxy-white. H.

E. Parmentieri. Free; a profuse flowerer, rose. S.



Fig. 545.—*Erica metulæflora bicolor*.



Fig. 546.—*Erica Shannoni*.

E. Paxtoni. Free in growth and flower; salmon-pink. H.

E. persoluta. Like *E. gracilis*, but white. Summer. S.

E. perspicua. Two forms, *erecta* and *nana*, both dwarf compact bushes with clusters of tubular bright-red flowers. S.

E. propendens. Shoots drooping; flowers lilac. S.

E. Shannoni (fig. 546). Good habit, free, white. H.

E. Spenceriana. A dense bush, with tubular, lilac-pink flowers. S.

E. tricolor. Numerous forms, free in growth, and abundant flowerers, the flowers inflated, flesh-coloured. H.

E. ventricosa. All the many varieties are good, forming compact, healthy, green bushes with usually stout shoots which flower profusely, the colour of the flowers varying from white to red.

E. verticillata. Loose habit; flowers in whorls, red. S. Var. *major*, has larger flowers.

E. vestita. Strong upright habit, flowers in whorls, reddish-scarlet. There are several varieties. July and August. H.

E. Victoria. Robust; flowers deep-red and white. H.

E. Willmorei. Like *E. hyemalis*, but flowering later. S.

[J. H.]

Eucharis (fig. 547).—A genus of beautiful white-flowered Amaryllids, natives of South America. There are six species, all of them in



Fig. 547.—*Eucharis amazonica*.

cultivation, and we have also now a considerable number of hybrids of garden origin. It is remarkable that the best species, *A. grandiflora* (*amazonica*), has not been found wild since its first introduction from Colombia in 1854. Twenty years later *E. candida* was introduced from the same country, followed by *E. Sanderi* (1882), *E. Mastersii* (1885), and *E. Bakeriana* (1890). The hybrids raised from these are not improvements on their parents. A hybrid between *E. grandiflora* and *Urceolina pendula* is an interesting plant, named *Urcocharis Clibrani*.

E. grandiflora is one of the most beautiful of all white-flowered plants. It can be made to flower at any time after it has made good

growth and been rested. It is propagated by division of the bulbs, which increase rapidly under generous treatment. It delights in good loamy soil with as much sand added as will keep the whole in a sweet healthy state; drain the pots sufficiently and pot firmly, just covering the bulbs; place them in a temperature of 65° during the night, with a rise of 5° or 10° in the day, giving a little shade in bright weather, always affording enough light and air to prevent the leaves from becoming drawn. By midsummer they will be well rooted and will begin to throw up side-shoots, when a larger pot may be given. Encourage growth through the autumn up to the middle of November, and then rest them in a lower temperature, say 55° at night, withholding water until the leaves flag slightly, when a little water may be given, but not enough to saturate the soil; withholding it again until the leaves flag, when the watering may be repeated. Two months of this treatment will be sufficient, after which the soil can be well soaked and the plants placed in a temperature 8° higher. Here they should push up a flower-stem from each bulb. After flowering remove into pots 2 or 3 inches larger, and return them to a house or pit kept at a temperature of 70° by night, and proportionately higher by day, treating them every way as in the summer previous. When the object is to get large specimens, it will be advisable to keep them growing during the summer and autumn, when rest can be induced as in the previous year. When the pots are filled with bulbs they can be made to flower twice a year.

Insects.—The *Eucharis* is easily kept free from insects, for though brown scale, mealy bug, and black thrips affect it more or less, they can be destroyed by sponging and the use of the syringe, the nature of the leaves being such that the pests are easily removed. The most injurious pest is the *Eucharis* mite, which see in chapter on Insect Pests.

Fuchsia (fig. 548).—This genus comprises about fifty species, mostly natives of Central and South America. They vary considerably in habit and in flower-characters, but the majority are sufficiently attractive to deserve a place among garden plants. Those commonly grown are either seedling-sports or hybrids of garden origin, *F. macrostemma* being the species principally used in their production. This was introduced in 1790 and distributed as *F. coccinea*. The first recorded hybrid was raised in 1830, since when a great number of hybrids and

seedlings have been produced. The principal breeders of Fuchsias are M. Lemoine, Mr. George Fry, and Mr. Henry Cannell of Swanley.

It would be difficult to name a plant more generally useful than the Fuchsia. The ease with which it can be grown as to both soil and situation, its flowering for eight or nine months



Fig. 548.—Fuchsias.

1, *Macrostemma*. 2, Mrs. H. Roberts. 3, Buffon. 4, General Gordon.

in the year, in almost every size from the tiniest up to the largest specimens in pots or planted out, or clothing a rafter or lofty conservatory pillar, mark it as an ideal garden plant; while out of doors, in the open border, it forms an important feature, unsurpassed for its drooping elegant habit and the profusion of flowers produced, until cut off by frost. By a selection of kinds possessing habit and flowers suited to the particular purpose for which they are required, they may be grown so as to bloom from early spring until October.

Propagation.—The Fuchsia may be treated as an annual, good plants being possible in about six months from seeds sown in February in pans covered with glass and placed in gentle heat. When the plants are large enough to handle, put them singly into small pots, keeping them all along in a stove-temperature, tolerably moist.

The compost should be two parts of good meadow-loam, one of leaf-mould, and one of silver sand. As they require more root-room they must be moved on, but not over-potted; pots of 3 or 4 inches diameter will be quite large enough for the present, and as soon as they are established the plants should be moved to a shelf near the glass in a warm greenhouse, where they will flower. If large plants are wanted the flower-buds should be taken off and the plants kept growing as long as possible. At the beginning of March move them into 6-inch or 8-inch pots, adding some well-decomposed cow-manure to the compost; give them a little more warmth, syringe overhead every afternoon, and later on shade slightly from the sun when it is powerful. Do not stop the plants, as is usual in the case of such as are intended for specimens, for if left to themselves in this way the habit of each can be more easily seen. A natural disposition to throw out plenty of side branches, and to form a dense compact pyramid, is of very great importance, for, however finely formed the individual flowers may be, a loose straggling habit renders the variety worthless. Any that are sufficiently distinct, and improvements upon existing kinds, should be retained, and such as are deficient at once discarded.

Fuchsias will strike readily from cuttings at any time of the year when shoots can be obtained in a free-growing condition, not disposed to flower; these latter do not either root or grow freely, and should be avoided. The most usual method is to place old plants in warmth about February, and as soon as they have pushed shoots a couple of inches, to take them off and put them in small pots or pans, an inch apart, placed in a temperature of 60°; they will root in two or three weeks, when they should be moved singly into 3-inch pots. If well attended to with water, and shaded when the sun is bright, they will grow rapidly, and must be again shifted into 7-inch or 9-inch pots as soon as those they already occupy are moderately filled with roots. Stop both leading shoot and side branches two or three times during the spring, staking the former so as to keep it upright. Syringed freely every afternoon, not only to promote growth, but to keep down aphides and red spider. By midsummer, under the influence of bright weather, the plants will be more disposed to flower than to grow.

If exhibition specimens are required, cuttings should be put in about the end of July, and when well rooted potted into 4-inch pots, keep-

ing them through the autumn and winter on a shelf near the glass in a night-temperature of 50°. At the end of February move them into 10-inch or 12-inch pots, according to the state of their roots; raise the temperature 5°; shade as the sun gets powerful, and stop both leaders and side-shoots. By the end of April they will be in a condition to move into 16- or 18-inch pots. Attend to them, with slight shade and air, as hitherto, and they will grow rapidly and commence flowering. The extra allowance of root-room will enable them to keep on flowering for a much longer time than if in smaller pots. After the last potting, a portion of the plants may again have the points of the shoots pinched out, which will cause them to flower later.

Early-bloomed plants may, when getting stale, be placed out-of-doors for three weeks in the summer to harden; then, after shortening the shoots to about half their length, replace them under glass, and syringe freely. In about a fortnight they will have broken into growth; then turn them out of the pots, reduce the soil a little, and give them a size larger pot, encouraging growth by syringing in the afternoons. So treated, they will flower well through the autumn.

Fuchsias are highly decorative when treated as greenhouse climbers. For this purpose they should be grown on a single stem, and when about 6 feet long planted out so that the stem can be trained against a rafter. As the lateral shoots develop they may be stopped, and this results in a canopy of shoots which hang gracefully and flower continuously all summer. When at rest, they should be severely pruned and cleaned as though they were Vines.

A selection of the best varieties.

Addington.	President.
Dunrobin Castle.	Prince Alfred.
¹ Alphonse Karr.	Princess May.
¹ Ballet Girl.	Queen of England.
Eureka.	Rupert.
Duchess of Albany.	Sedan.
England's Glory.	¹ Sir Garnet Wolseley.
General Roberts.	Splendens.
¹ La France.	¹ Victor Hugo.
Loveliness.	Walter Long.
Mrs. G. Rundell.	¹ White Phenomenal.
¹ Mrs. Hill.	

¹ Double flowers.

Gaillardia (fig. 549).—The numerous popular garden forms of this genus have been raised from *G. aristata* and *G. pulchella*, natives of North America. The forms and colours of the flowers have been materially modified, but all

have a brown-on-black disc, excepting one called Vivian Grey, with yellow disc, which was raised and sent out by Messrs. Kelway. There are varieties with quilled yellow and crimson florets, resembling the Trumpet Honeysuckle, others with two rows of ray florets,



Fig. 549.—Gaillardias.

and others entirely double. Gaillardias make a grand display in the garden from June to October, never suffering from drought in the hottest and driest of summers, and growing freely in any soil. They stand any ordinary degree of cold without the slightest protection, the plants bursting through the earth's crust freely after a severe winter. They may be transplanted at almost any time of the year, but if planted from February to July they bloom freely the same season. Although they thrive in any kind of soil, they are all the better for deep digging and manuring. The flowers are invaluable as cut bloom, lasting quite a week in water.

Some of the best varieties are James Kelway, Carlin, Hannibal, Rob Roy, Vivian Grey, Rose of Huish, Khartoum, Langport, Primrose Dame, Golden Number, Plenissima, Westward Ho, Kenilworth, Columbus, W. B. Child, Old Custus.

Gladiolus.—From this large and diversified genus, which is chiefly South African, three distinct garden races, known as Gandavensis, Lemoinei, and Nancyanus, have been raised. The first-named (fig. 550) is supposed to be the result of crossing *G. psittacinus* and *G. cardinalis*, Dean Herbert among others having made this cross about seventy years ago. The well-known typical *G. Gandavensis*, thus named by Louis Van Houtte, was one of the first of the hybrids thus obtained. Since then numerous crosses and seedlings have been raised by English, French, and Dutch breeders, the most successful perhaps being the late Mr. James Kelway, whose nursery at Langport has long been famous for the Gladiolus — new and improved seedlings originating there yearly. The “Kelway strain” is remarkable for length and thickness of flower-spike,



Fig. 550.—*Gladiolus Gandavensis*.

exceptional size of flower, and great range of colour. Mr. Burrell of Cambridge is also a successful breeder and exhibitor of this race. The plants ripen seeds freely under cultivation, but the varieties do not come true from seed. To obtain a good strain, the best varieties should be crossed with each other. The seeds should be dried as soon as ripe, and kept dry until April, when they may be sown in boxes in a frame, or in the open on a sunny border—in short, treating them much the same as if they were seeds of Onions. The small bulblets or “spawn” produced about the bases of mature corms should be collected, dried, and sown as recommended for the seeds. Of course the “spawn” will reproduce exactly the characters of the parent plant.

The Lemoinei race (fig. 551) was raised by M. Lemoine, of Nancy, in 1875 from *G. purpureo-auratus*, crossed with good varieties of the Gandavensis race. It is distinguished by its hooded flowers, and by its rarely having more than four to six good flowers open at one time on the spike. It is supposed to be hardier than

the Gandavensis race, and in some gardens the corms have flourished when left undisturbed in the ground year after year.

The Nancyanus race (fig. 552) was also raised by M. Lemoine, who in 1883 crossed *G. Saundersii* with some of the best of the forms of the Lemoinei race. Practically the same cross was made about the same time by Max Leichtlin, who raised hybrids between *G. Saundersii* and forms of *G. Gandavensis*; these were distributed under the name of *G. Childsii*. This race is remarkable for the large size, openness, and rich varied colours of its flowers, and although the spikes are less crowded with flowers and less rigid than those of the Gandavensis race, they are none the less beautiful.

The cultured requirements of all three sections are essentially the same. The soil should be light and loamy, well drained if of a clayey character, and deeply trenched. In October the bed should be dug over and a layer of rotten manure worked in. On a dry day in March it should be hacked over with a fork or hoe, and drills made 18 inches apart and 3 inches deep. Large corms should be planted a foot apart. If the corms are planted fortnightly from the



Fig. 551.—*Gladiolus Lemoinei*.

end of February till the middle of May, a succession of flowers is secured. When the spikes are strong they should be staked, and

from now onwards weak liquid manure may be given. Should the weather be dry, a mulch of light manure preserves the corms and roots against heat and drought. The corms should be lifted as soon as convenient after the flowers have faded and before the leaves decay. When

succession, some can be had in flower when there are but few greenhouse plants in bloom. They may be planted as late as June to flower in November.

The following lists comprise some of the best forms in each section:—



Fig. 552.—*Gladiolus Nancyanus*.

dried, the stems should be taken off the corms, and the latter stored in a dry shed or fruit-room.

For ordinary flower-garden decoration—such as the embellishment of borders, for filling up spaces in beds—groups of three or more corms, either of one or different varieties, can be planted. Good soil is essential if a fine decorative effect be desired.

Pot Culture.—Though this is a practice not much followed, yet by cultivating in this way a fine effect can be had in the conservatory. A 24-sized pot will be large enough for a strong bulb, and the compost recommended by Mr. Kelway is one part decomposed hot-bed manure and three parts rich loam, with a little river or silver sand under each bulb. Potting can be done at any time during March and April, and the pots need to be plunged in rich soil in an open situation, and have liberal supplies of water in dry weather. As soon as the flower-stems begin to lengthen they should be tied to stakes to protect them against danger from wind. If the corms be planted later, for

Gandavensis Varieties.

Prince Ranjitsinghi.	Stasilus.
Flying Fox.	Brice.
Peter Drummond.	Eclipse.
Richard Milner.	Agraulis.
Richard Martin.	Kenneth Kelway.
Lady Montague.	Wellington.
Burne-Jones.	Shahzada.
Turner.	Leonard Kelway.
Arthur Toms.	F. Field.
Eugene Sandow.	Paladore.
Miss Munro.	Ben Alder.
Metastasio.	Lady Llangattock.
Oppius.	Menabrea.
Felicite.	Molesworth.
Martel.	Sir H. D. Wolff.

Nancyanus Varieties.

Antoine Rivoire.	Max Cornu.
Antoinette Thiry.	President Faure.
Canrobert.	President Carnot.
Edouard André.	Roland.
Henri Vauthier.	Sir Trevor Lawrence.
James Veitch.	Surprise.
Jean Dybowski.	Soliman.
Julien Gerardin.	Titien.
Le Grand Carnot.	Volontaire.
Le Geant.	Walter Scott.

Lemoinei Varieties.

Adelina Patti.	Ethiopie.
Amiral Gervais.	Lady H. de Walden.
Avant-Garde.	Madame Valmore.
Armenian.	Muscovite.
Baron Hulot.	M. Meline.
Charles Ellis.	Rev. W. Wilks.
Comédie.	Roi de Siam.
Charles Rabot.	Senateur Volland.
Edouard Foa.	Stamboul.
Eldorado.	Vesuvius.

Gloxinia (*speciosa*)—see Plate.—Although represented in gardens by several distinct races or types, yet there does not appear to be any proof that any species has been concerned in the development of Gloxinias other than *G. speciosa*, now referred to *Sinningia*, and which was introduced into England from Brazil in 1817. A larger form of it was obtained from the Organ Mountains by Messrs. Veitch in 1842, and several other named varieties have at different times been imported from Brazil. They all have nodding flowers with narrow tubes, and their colour is either purple or white. The bright-scarlet, blue, pink, and mottled forms with erect flowers are of garden origin.

If we take into account their distinctness, their continuous-flowering habit, their exquisite colours, and the ease with which they may be grown, it will at once be seen that they are invaluable in the indoor garden.

Propagation.—Gloxinias can be raised from seed sown early in spring, and treated as for Begonias. They should be transferred into 3-inch pots when the leaves are an inch or so long, and as soon as they have made a fair amount of roots, move them again into 6-inch pots, using loam in the proportion of three parts to one of leaf-mould, with enough sand to keep it open. Cuttings of the leaves are also used for the propagation of special sorts, a mature leaf, with a small portion of the stalk attached, being inserted in sandy soil, in small pots, placed in heat, shaded, but not kept too close or they are liable to damp. Or the leaves may be cut into sections, an inch square or so, cutting clean through a principal vein or rib, and used as cuttings.

After the plants have flowered, keep the soil moist until the leaves wither, when the tubers should be shaken free of soil and stored through the winter in dry sand in a temperature of 50°. They may be started again at several different times so as to give a succession through the summer. Plant them in 4-inch or 6-inch pots, and place them in a temperature of 60°, in full light, or they will become drawn. When well-rooted, repot them into 8-inch pots, in which they will flower. They dislike a close, moist atmosphere. To prolong their blooming season give manure-water as soon as the flowers begin to appear. There are numerous named varieties, but if seeds of a good strain are obtained from a reliable source, flowers of first-rate quality and sufficient variety may be expected. The colours are reproduced fairly true from seeds.

Hippeastrum (*Amaryllis*), fig. 553.—A popular genus, much improved by the hybridizer and cultivator in recent years. The oldest species is *H. equestre*, introduced from the West Indies in 1778. *H. Reginae* flowered at Hoxton in 1728, and was so named because it flowered on the birthday of Queen Caroline, wife of George II. *H. vittatum*, introduced from Peru in 1769, is interesting because the first hybrid was raised from it and *H. Reginae* by a watchmaker named Johnson in the year 1799, and was named *Johnsoni*. Dean Herbert enumerates in his *Amaryllidaceae* (1837) thirty-one hybrid Hippeastrums, all, except four, raised by himself. Amongst them was one with pale

orange-coloured flowers (*H. Herberti*), since lost. In 1830 De Graaf of Leyden began to hybridize Hippeastrums, using as breeders *H. vittatum*, *H. Johnsoni*, *H. fulgidum*, and *H. crocatum*, and to him and his son English raisers are greatly indebted for many of the crosses employed in the further evolution of the garden race of



Fig. 553.—Hippeastrum (*Amaryllis*).

these plants. The introduction of *H. pardinum* in 1861, and of *H. Leopoldi* in 1869 from Peru, gave a new impetus to the work of the breeder, and it is to the influence of these two species that we owe the full, rounded flowers known as the florists' type. Messrs. Veitch and Sons, of Chelsea, have produced many very fine seedlings. Other cultivators, both in public and private gardens, namely, Kew, the garden of Captain Holford at Westonbirt, and of the Right Hon. Joseph Chamberlain at Highbury, have also raised seedlings of merit, new ones being added annually.

Cultivation.—The soil should be composed of three parts fibrous yellow loam, and one each of fibrous peat, leaf-mould, and rotten straw-manure. Double the quantity of leaf-mould may be used without peat, or a double quantity of peat without leaf-mould. Some coarse white sand should also be added. A good time to repot Hippeastrums is the second week in January, whilst the bulbs are at rest. Pots of 4 and 5 inches for the smaller bulbs, 6 inches for medium-sized ones, and 7 or even 8 inches for the largest should be used. These should be well drained. Shake the bulbs free

of all old soil, remove all dead roots, and see that the bulbs are quite sound. Any offsets that have formed separate roots and are attached rather loosely to the sides of the old bulbs should be removed and be potted separately in 60° pots. Press the soil about the bulb and roots firmly into the pot, so that, when finished, about half of the bulb is covered. The compost should be pressed with the fingers, and not with a wooden rammer. Then plunge the pots up to the rims in spent tan, where they will have a bottom heat of from 75° to 85°. The temperature of the house ought not to be more than from 55° to 60° to start with. Give no water for at least two weeks after repotting, when new roots will be formed and some growth made. In about three weeks both leaves and flower-scapes should show, when the temperature may be increased 5°. Two weeks later a minimum of 60° will be most suitable. The bulbs, which were plump at potting-time, now shrink rapidly, their substance going to make leaves and flowers. Careful cultivation should be continued for some time after the flowers are over, in order that the bulbs may become strong and well developed for next year's flowering. The bulbs plump up again much better if the tan bed is turned over, and some quicklime added to destroy vermin, replunging the pots over the rims, so that the roots may push out from the top and run into the tan, which they readily do. After this they do not need water oftener than about once a week, when the entire bed should be well watered. In a few weeks it should be quite a mass of roots. Growth continues until the end of August, or later, when water must be withheld, and the house well ventilated night and day. Light shading is necessary only when the sun is powerful. When sound bulbs of large size do not flower, it is owing to mismanagement the previous season. Under proper treatment not five per cent will miss flowering.

The *Hippeastrum* is easy to cross-fertilize. The anthers must be removed when the flowers are less than half-opened; about two days later the stigma is ready for fertilization with ripe pollen from another flower. The operation should be performed daily until all the flowers are fertilized. Only the best varieties should be used as breeders. The seed should be ripe in May, and may be sown at once, about fifty in a 6-inch pot, in bottom heat. They vegetate in about eight days. When about a fortnight old prick out the seedlings,

putting a dozen or so in a 6-inch pot. They should be kept dry in a warm greenhouse in winter. In January repot them, putting three plants in a 5-inch or 6-inch pot. Plunge them in bottom heat, and treat them exactly as for the large bulbs. Seedling bulbs do not lose their leaves in winter. They must, however, be rested from November to January, when they may be planted singly in 5-inch pots, and with good culture they will form flowering bulbs by the end of the season.

Hippeastrums are subject to basal rot, caused probably by over-watering, although it is attributed to a fungus, the presence of which is consequent upon bad watering. They are also subject to attacks from red spider, thrips, and mealy bug. Red spider appears usually in hot dry weather. It should be kept under by daily syringing when the house is shut up in the afternoon. Thrips are destroyed by tobacco fumigation, or washing the leaves with tobacco water. Mealy bug is nearly always present under the outer coatings of the bulbs, or at the base of the leaves, causing them to die off prematurely. They are also subject to attacks of the bulb-mite, usually an indication of improper cultivation. Full directions for its eradication will be found on p. 100, under "Bulb Mite".

The named hybrids and seedlings are now very numerous, no less than 120 having received certificates from the Royal Horticultural Society. Some of the best are:—

Aspasia. White, feathered with scarlet, broad white band.

Conqueror. Bright crimson-scarlet, extra large.

Doris. Dark crimson-scarlet toned with maroon.

Eclipse. White striped with light crimson-scarlet.

Eldorado. Orange-scarlet with darker veins.

Ercles. Rich-scarlet toned with carmine, extra large.

Excellent. Scarlet toned with crimson, white rays.

Her Majesty. White flushed with scarlet, broad band.

Ideala. Cream-white with deep orange-scarlet blotches.

Kineton. Light-red with large white star.

Lustrous. Deep brilliant-scarlet toned with crimson.

Major Wilson. Dazzling crimson-scarlet, extra large.

Olympia. Crimson-scarlet tinted with orange.

Sir William. Large flower, uniform bright-crimson.

Speculum. Crimson self, very brilliant.

Tacola. Large with broad segments, bright-scarlet with a broad white median band.

The Vigil. White with red markings on upper segments.

The best of the species are:—*solandriflorum*, *aulicum*, *psittacinum*, *pardinum*, *Reginæ*, *Leopoldi*, *equestre*, *reticulatum* var. *striatifolium*, *procerum*, *vittatum*. [J. D.]

Hollyhock (*Althea rosea*) (fig 554).—A native of China, but has been an inhabitant

of our gardens for more than three centuries, although it is only within the last sixty years that attempts to improve it have been made. Charles Baron, of Saffron-Walden, a shoemaker, was the first of the improvers; and he was

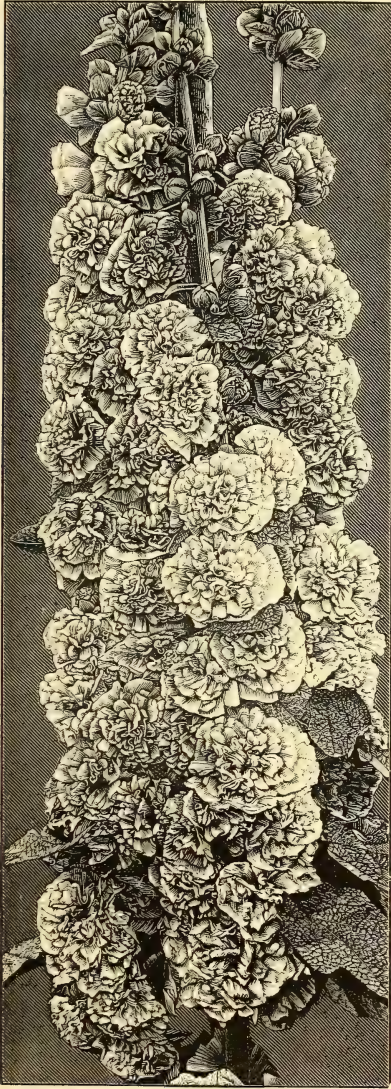


Fig. 554.—Hollyhocks.

followed by Paul, Chater, Bircham, Parsons, Roake, the Rev. Edward (afterwards Lord) Hawke, and others. By their exertions what was originally a single or semi-double flower was brought to a high state of perfection, and became largely grown for exhibition purposes. The Hollyhock may be said to have reached its highest popularity in the sixties. About this time, however, a deadly fungus, *Puccinia malvacearum*, attacked it, destroying several leading collections, a considerable number of

the finest named varieties being wholly lost to cultivation through it. In recent years this terrible disease has been less injuriously active than formerly, with the result that the plant appears to have regained much of its former vigour. New varieties are again being raised, and the Hollyhock is again lifting its head among border plants.

The single-flowered forms are also to be recommended. They seed very freely, are happy under ordinary conditions, they grow well and flower most profusely, and they are of varied colours. There are no more stately border plants in July and August. In proportion as the flowers of the double varieties approach the highest quality, seed-production is limited. Consequently there are many more expanded blossoms on a spike at one time, and they are much more lasting. This makes the double-flowered varieties preferred by some, notwithstanding their tendency to fall a prey to the fungus disease and their more special requirements from the cultivator.

Propagation.—Named varieties are increased by means of cuttings or grafts or division. Cuttings are made from the young shoots taken off close to the old root-stock when they are 3 inches long. They are planted singly in small pots of light, sandy soil, and placed in a cold frame, where they are sprinkled and shaded till rooted. If slow in rooting they may be forwarded by a gentle bottom heat; those put in between October and March should always have heat.

Grafting is done both in autumn and spring, the former being the best time if proper shoots to use as scions are obtainable, which is not always the case, especially if the plants are allowed to seed: as then some time elapses before they throw up shoots. It is usual to use as a stock the root of some inferior variety. The plants may be lifted in autumn or spring, and divided with a spade in the ordinary way.

Seeds sown in January and February on a gentle bottom heat, with careful after-treatment, will afford a stock which, if planted out in early summer in the open, will flower the same year, permitting of the selection of the best varieties to be retained. Some growers sow the seeds in pans or boxes in June or July, pot off the young plants singly into small pots, and keep them through the winter in a cold frame, planting them out in early spring; or they deeply dig a convenient piece of ground, draw drills in it a foot or so apart, sow the seeds thinly, and allow the plants

to remain in this position until the following spring.

Soil.—The Hollyhock is a gross feeder, and should have a deeply-dug and well-manured soil. The old growers trenched their ground, working in an abundance of manure; and after the plants had become established they were mulched with half-decomposed manure, and copious waterings given. Such liberal treatment results in vigorous growth and fine spikes of bloom. No plant more readily answers to liberal culture, or suffers more when starved in poor soil. The tall stems should be supported with stout stakes quite 5 feet high.

The Hollyhock is a perfectly hardy plant, but is liable to harm from excessive moisture in winter when planted on low-lying or imperfectly drained ground; and when it is sought to establish a permanent plantation this fact should be borne in mind. In cold and moist northern localities it is customary to lift choice varieties in autumn and either pot them or plant them out in a prepared bed in a cold frame.

Selection of Double-flowered Varieties.

- Alba superba.* A fine white.
- Alfred Chater.* Bright-rose.
- Amaranth.* Soft amaranth-pink, extra fine.
- Bijou.* Scarlet tinted with buff.
- Curus Chater.* Crimson-scarlet.
- Ecultium.* Purplish-maroon.
- Fire King.* Bright reddish-carmine.
- Golden Drop.* Fine pure-yellow.
- Mulberry Gem.* Rich glowing-mulberry.
- Nymph.* White, tinted delicate-pink.
- Primrose Gem.* Primrose.
- Walden King.* Deep-crimson.

[R. D.]

Hyacinth (*Hyacinthus orientalis*).—One of the best-known of garden flowers, with a history which goes back some 300 years. Gerard (1596) mentions purple, white, single, and double blue varieties, and Philip Miller states that in the early part of last century 2000 varieties were enumerated in the catalogues of the Dutch growers.

Hyacinths are most successfully grown in and near Haarlem in Holland. There the soil is almost pure sand, but the ground is enriched with frequent dressings of cow-manure. It is probable that the Hyacinth might be grown to as great perfection in England as in Holland, for our climate is as suitable as that of Haarlem. It is a mistake to suppose that the bulbs degenerate in England. Attempts have been made from time to time in this country to compete with the Dutch in the Hyacinth trade, but

they have not been supported by buyers, and the Dutch produce still holds the field.



Fig. 555.—Single Hyacinths.

Propagation.—The Hyacinth seeds as freely in England as in Holland, and the seeds, if



Fig. 556.—Double Hyacinths.

sown as soon as ripe, in boxes in frames, in fine sandy soil, germinate freely.

Offsets from the old bulbs may be planted in beds of rich soil in the autumn. The general method of propagation, however, is by means of the small bulblets formed at the base of the cross-cut bulbs (fig. 557). They form in the

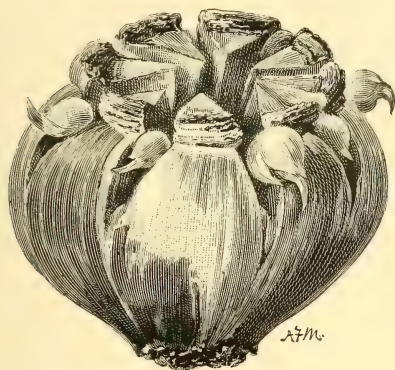


Fig. 557.—Hyacinth Bulb with Offsets.

incisions, often profusely, and are removed and planted in beds, where they make some growth the first year and form nice little bulbs. The best bulbs require four years' growth, but many are sold as best when only three years old.

Culture in Beds.—The Hyacinth is planted in almost every garden, public or private, for spring effects. It requires a light rich soil of moderate depth, with an annual dressing of decayed manure. If the soil is heavy, sand spread on the surface and dug in is of much value. Where leaf-mould can be obtained it is excellent to mix with the sand. The soil should be well worked and in good condition before planting in October. The bulbs should be set about 4 inches in depth, with a little clean sand under and over them. If planted well and in good soil, and allowed to ripen naturally before they are taken out of the ground, afterwards drying them in an airy shed, not in the sun, they may be used again the following year. Remove all offsets as soon as the bulbs are dry, and plant them in a bed, the large flowering bulbs only being kept to plant again for flowering. A few of the larger offsets may produce a flower-spike, but they cannot be depended upon.

Culture in Pots.—Hyacinths are easily cultivated in pots to the highest standard of excellence. It is important to obtain the very best bulbs for this purpose. To ensure a succession of bloom a few dozens of the earliest varieties should be potted about the middle of September in 5-inch pots, putting in the main batch a month later. November is too late for good blooms. The soil, which should be prepared

in August, should be rich; good loam two parts, manure one part, leaf-mould one part, and sand one part, well mixed, and left in a heap in the open air until it is used. The best manure is equal parts of cow-manure and horse-droppings mixed in a heap until fermentation takes place, turning it frequently to prevent over-heating. In a month it will be ready for use. Drain the pots with three or four crocks. A little sand should be placed under each bulb and the compost pressed in firmly, leaving the crown of the bulbs about level with the surface, finally covering the crowns with sand. The pots may then be placed on a hard bottom of ashes, and covered with cocoa-nut fibre, decayed tan, or leaf-mould. Coal-ashes are sometimes used, but the other materials are preferable. The layer above the top of the pots ought to be about 4 inches deep. Those intended to flower early should be taken out of the plunging material as soon as the roots have reached the side of the pot, inverting a small pot over the crown for a few days until the crown has become green. The bulbs not intended for forcing need not be disturbed until early in January, when they may be placed in a frame, kept close for a few days, and shaded with mats until the leaves lose their blanched appearance. They must be protected from frost whilst in the frame.

Hyacinths do not require large supplies of water, notwithstanding that they will grow and flower well with their roots permanently in water. About once in a week at first is often enough, and even when in full growth two or three times a week are usually sufficient. Weak liquid manure may be given weekly during active growth. The plants should always be placed near the roof-glass to prevent the leaves and spikes from being drawn and weakly. In forcing avoid a high temperature; 55° to 60° is high enough in winter. As soon as the flowers at the base of the spikes begin to open, remove them to the cool house or frame to develop fully. The spikes will require support. The neatest is of stoutish wire bent at the end and inserted in the soil without injuring the bulb; if neatly affixed the support is quite hidden by the leaves and flowers. When the flowers fade they should be cut off, and the bulbs placed out-of-doors or in a frame to ripen.

Culture in Glasses.—Hyacinths grown in glasses are very ornamental in drawing-rooms, and their treatment is exceedingly simple. Firm well-ripened bulbs should be chosen, and the glasses having been filled with rain-water the bulbs

should be placed so that the water just touches them. The glasses should then be placed for a few weeks in an ordinary cupboard or similar dark place, removing them into the light again when the roots are about 4 inches in length. A few days afterwards they should have all the air and light possible, otherwise the foliage and flower-stem will be drawn up and weakly. When the leaves are produced the glasses may be kept filled up with water as required. Fresh water should be supplied whenever that in the glasses becomes impure, but at whatever time it is given it ought to be of the same temperature as the air in which the plants are growing. A few pieces of charcoal placed in the glasses when the bulbs are set in them will not only greatly assist in keeping the water pure but will be of service to the plants also.

SELECT LIST OF VARIETIES.

Single Red:—Cavaignac, Charles Dickens, Etna, Fabiola, Garibaldi, Macaulay, Prince Albert Victor, Solfaterre, Von Schiller, Vurbaak. *Single Blue*:—Baron von Luyll, Blondin, Captain Boyton, Czar Peter, Grand Maitre, King of the Blues, Lord Byron, Lord Derby, Marie, Prince of Wales, Queen of the Blues, Souvenir de J. H. Veen, The Sultan. *Single White*:—Alba maxima, Baroness von Luyll, Grandeur à Merveille, La Grandesse, Mont Blanc, Princess Amalia. *Single Yellow*:—Bird of Paradise, Duc de Malakoff, Ida, King of the Yellows. *Double Red*:—Koh-i-noor, Lord Wellington, Noble par Mérite, Princess Louise. *Double Blue*:—Blocksberg, Charles Dickens, Garrick, Laurens Kozter, Louis Philippe, Van Speyk. *Double White*:—Anna Maria, Florence Nightingale, La Tour d'Auvergne, Lord Derby, Princess Louise.

[J. D.]

Iris.—A beautiful genus comprising nearly two hundred species, many of them being popular garden plants. The common *Iris germanica*, or "Flag Iris", and the bulbous kinds, like the English and Spanish (see Plate), have varied from seed so profusely that their forms are well nigh innumerable. It is quite possible to have some species of Iris or other in bloom every day in the year, and many are so abundant and grown so easily that the name of "Poor Man's Orchids" has been applied to them.

The genus may be divided roughly into: (a) *rhizomatous* and (b) *bulbous* species. The ever-green Flag Irises are rhizomatous, and are divided into "bearded" and "beardless" groups. The "Cushion" Irises, such as *I. Susiana*, *I. Gatesii*, and *I. Lortetii*, are very remarkable in size, form, and colouring, and they are worth all the special care required to succeed with them.

The best authorities on Irises are Sir Michael

Foster, of Great Shelford, Cambridge, and Mr. J. G. Baker, F.R.S., of Kew. The Rev. Mr. Ewbank, of St. John's, Ryde, Isle of Wight, is one of the most successful amateur cultivators, and Messrs. Barr & Sons, of Long Ditton, have the finest collection in the trade; our selections of the best cultivated varieties are based on their clear and well-arranged lists by special permission.

Culture.—The different sections of Iris are so varied in habitat and in constitution that no one system of culture can be adopted for them. Thus our native marsh Iris and its variegated forms love water - margins and boggy ground. A similar position also suits the Japanese *I. laevigata* and the great bulbous Iris of the Pyrenees (*I. xiphoides*). On the other hand, it is scarcely possible to plant *I. germanica* and all its forms, or the bulbous *I. xiphoides* and its allies, in too warm and dry a soil. The German Iris will grow and bloom as well in road scrapings on an old wall top or over an arched gateway fully exposed to sunshine and to wind as anywhere else. Most of the strong-growing rhizomatous kinds thrive in any good garden soil. The Algerian *I. stylosa*, on the other hand, often requires to be judiciously starved to make it flower, and as it does this in mid-winter and early spring, it requires a sheltered position. The beardless, rhizomatous kinds grow in any good well-worked garden soil.

One of the sweetest of all dwarf bulbous Irises is *I. reticulata* (fig. 558), which now and then increases rapidly in good fresh loam, but requires special quarters on heavy wet soils. A bed for it may be dug out and well drained, and filled with fresh turfy loam well matured. Plant the bulbs about 3 inches deep and apart on a thin layer of cocoa-nut fibre and clean sand well mixed together. They may be dug and replanted every year.

The gorgeous Clematis Irises of Japan (*I. laevigata*) require special treatment, though on deep rich holding soils we have seen them beautiful in beds or in the mixed herbaceous borders. Being semi-aquatic, however, they are seen in their full glory when grown at the water's edge. Mr. Peter Barr, writing from Japan in June, 1899, says: "The Japanese grow this Iris in their rice-fields, which are flooded during summer but drained off in winter, by means of ditches, into the nearest creek, pond, or river. During winter, while the plants are at partial rest, they receive three to five waterings with liquid human or cow



IRIS GARDEN AT KEW



TALL BEARDED FLAG IRISES



SPANISH IRISES

manure (not horse-manure, which is unsuitable). As soon as the plants start into growth in the spring they receive no more manure, but water is again let in 1 to 3 inches deep. They are grown in full sunshine." In this country, to grow them to perfection they should be planted at the margin of streams or ponds, and manured as described above; or in

or, better still, marsh reeds or cut heather, which remove in March. Immediately these Irises have done flowering, place over the plants a light, or panes of glass elevated 18 inches above the ground, so as to provide for a free entry of air, and at the same time to keep off rain till October. The object desired is to thoroughly ripen the roots, and prevent their starting into growth too early. The covering in winter is to keep off heavy rains, and discourage a premature growth. Or the roots may be lifted four or five weeks after they have done flowering, and stored on a dry sunny shelf or in perfectly dry sand till December, when replant. The great beauty of these Irises, especially when seen in established masses, will fully repay the special treatment they require.



Fig. 558.—*Iris reticulata*.

gardens where no stream or pond exists they may be successfully grown in the following manner: barrels sawn in half, and with the bottoms knocked out, should be sunk into the ground on lawns, or in connection with the rock-garden. The bottom should be well puddled with stiff clay, on which place a foot of good loam. Then plant the Irises, and manure as they do in Japan at intervals before spring growth commences. These sunken tubs can be easily kept wet during summer.

Of all Irises the most remarkably handsome and difficult to grow are the so-called Cushion Irises, belonging to the *Oncocyclus* and *Regelia* sections. Plant the roots in December (the tops not more than 1½ inch below the surface) in a light well-drained soil (without manure), and cover with 3 or 4 inches of wheat-straw,

I. TALL RHIZOMATOUS OR BEARDED FLAG IRISES (see Plate).

The flowers in this section are all large and handsome, more or less beautifully mottled in the standards and veined in the falls, while the beards range from delicate primrose to orange. Their beauty at first sight rivals that of the Orchid, but, on closer examination, we have no hesitation in saying they yield points of interest not to be found in the whole of the Orchid family. In colours there are the richest yellows, the most intense purples and delicate blues, the softest mauves and very beautiful claret-reds. There are also whites, and primroses, and bronzes of every imaginable shade—indeed language fails us in picturing all the beauties of this flower. They thrive in almost any position, but flower best in a rather dry and sunny situation, as on walls and dry banks.

The varieties are here arranged in natural groups, to facilitate selection. Each group has a distinct character. *I. germanica* flowers first, and is represented by the blue, purple, and white Flag Irises of our gardens; these bloom together, and are extremely decorative in May; following, in June, come the varieties of *I. aphylla*, *I. amœna*, *I. neglecta*, *I. pallida*, *I. squalens*, and *I. variegata*, with their beautiful colours and markings. All are delicately fragrant.

In the descriptions S. is used to signify Standards, or the erect petals; F. Falls, or the drooping petals.

Germanica. Common Blue Flag, alba, Fontarabie, Kharput, Kochii, macrantha, Purple King, Siwas.

Aphylla—Flowers with bright-coloured frill-like margin on a white ground. Bridesmaid, delicatissima, Gazelle, Madame Chereau, Swertii.

Amœna—Standards white; colours of Falls various. Alice Barr, Calypso, Comte de St. Clair, Duc de Nemours,

Glorietta, Morpheus, Mrs. H. Darwin, Mrs. G. Darwin, Victorine.

Neglecta—Standards ranging in colour from lavender to purple. Amabilis, Boccage, Cordelia, Fairy Queen,



Fig. 559.—*Iris pumila*.

Florence Barr, Kitty Kingsbury, Lavater, Miss Maggie, Sultana, Virginie, Willie Barr.

Pallida—Flowers mostly lavender, or blue, or rose. Albert Victor, Astarte, Celeste, Dalmatica, Princess Beatrice, Khedive, Leonidas, Mandralisæ, Queen of May, Victorine.

Squalens—Standards mostly of cloudy shades of copper, bronze, and fawn. A. F. Barron, Britannia, Bronze Beauty, Exquisite, Harrison Weir, Lady Jane, Lord Grey, Monsieur Chereau, Mozart, Sir Walter Scott.

Variegata—Standards yellow; colour of Falls various. Adonis, aurea, Beaconsfield, Darius, Ganymede, Gracchus, Humboldti, Louis Meyer, Maori King, Mrs. A. F. Barron, Prince of Orange, Robert Burns.

Other tall bearded Flag Irises are:—*albicans*, *Biliotti*, *Ciengialti*, *flavescens*, *florentina*, *lurida*, *sambucina*.

II.—DWARF BEARDED FLAG IRISES (fig. 559).

These grow 6 to 12 inches high, and flower during March, April, and May. They succeed in almost any soil and situation, and are valuable for front groups in mixed borders, as edgings, or to mass on rockeries, also for old walls, &c.

benacensis, from south Tyrol. Flowers bright-violet.

biflora purpurea, rich purple.

„ *maculata*, soft-blue, marbled-purple.

Chamaïris, deep-violet, very free-flowering.

„ *alba*, S. pure-white, F. sulphur-white.

„ *aurea*, bright deep-yellow.

Chamaïris aurea maculata, S. yellow, F. marbled purple.

„ *italica*, purple, fine dwarf species.

„ *lutea grandiflora*, fine-yellow.

„ *sulphurea grandiflora*, full sulphur-yellow.

Fieberi, violet-blue flowers, large, height $\frac{3}{4}$ foot, handsome.

lutescens, pale-yellow, fine.

„ *aurea*, deep-yellow, with orange beard.

„ *Statella*, S. white, F. pale-primrose, height $1\frac{1}{2}$ foot.

nudicaulis, S. purple, F. crimson-purple.

„ *purpurea*, purple, large bold flowers.

olbiensis grandiflora, rich violet-purple, extra fine.

„ *sulphurea grandiflora*, yellow.

Princess Ida, S. clear primrose, F. sulphur-yellow.

pumila bicolor, S. white, F. purple, rare.

„ *Count Andrassy*, flowers large, blue, darkly veined.

„ *luteo-maculata*, S. primrose, F. brown, edged yellow.

virescens major, S. sulphur, F. primrose, stained purple, sweet-scented.

III.—JAPANESE FLAG IRISES.

I. laevigata (*Kämpferi*), the *Clematis-like Iris*.

(See p. 386, fig. 483.)

The beauty of these newer Japanese Irises surpasses any written description. The large flat flowers measure from 6 to 8 inches in diameter, with a breadth of petal 3 to 4 inches; the prevailing colours are white, red-purple, crimson, rose, lilac, lavender, French gray, purple, violet, and blue, each flower usually representing several shades, while close under the petaloid stigma there is a brilliant yellow or orange blotch or feather, more or less conspicuous, and almost always surrounded, except in



Fig. 560.—*Iris cristata*.

the whites, by a halo of blue or violet. Their season of blooming is from June to August.

There are many named varieties, some with double flowers, of Japanese origin.

IV.—BEARDLESS RHIZOMATOUS FLAG IRISES.

aurea, large golden-yellow flowers, height 4 feet.

„ *Laucheana*, large rich clear golden-yellow.

Delavayi, new, Chinese, flowers violet, height 3 feet.

ensata, soft-lilac colour, height 1 foot, early.

fetidissima (*The Gladwyn Iris*), purple; seed-vessels prized for winter decorations, height 1½ foot.

„ *fol. variegatis*, silver and green leaves.

fulva, coppery-red and orange, height 2 feet.

graminea, blue and purple, charming, height 1 foot.

„ *latifolia*, broader foliage, height 1 foot.

Guldenstadiana lutescens, primrose-yellow, height 2 feet.

„ *alba*, flowers white, height 2 feet.

„ *cerulea*, flowers blue, height 2 feet.

humilis, purple and white; short scapes, foliage 2 feet,

Japonica (imbriata), pale-lavender with golden crest, height 1½ foot; sunny position or in cool greenhouse.

longipetala superba, porcelain-blue with golden blotch, free, height 3 feet.



Fig. 561.—*Iris Susiana*.

Milesii, purple-blue with yellow crest, height 2 feet.

missouriensis, lilac with yellow spot, early, height 2 feet.

Monnierii, golden-yellow, height 3 feet; strong grower.

Monspur, large solid violet-blue flowers of great substance, of great value for growing either by the waterside or in the border, height 4 feet.

orientalis (ochroleuca), pure white and yellow, large, handsome.

prismatica, light-blue, spotted orange, height 2 feet.

pseudo-acorus (Water Flag), yellow, height 3 feet.

„ *Bastardi*, primrose.

„ *variegata*, foliage variegated in spring.

ruthenica, a miniature species, with fan-like foliage and blue flowers in July, violet-scented, height ¾ foot.

sibirica, elegant, narrow leaves; flowers bright-blue, height 3 feet.

„ *atro-purpurea*, purple, very fine.

„ *flore pleno*, deep-blue semi-double flowers.

„ *lactea*, milky-white.

„ *orientalis (sanguinea)*, velvety-blue, very fine.

spuria, bright lilac-blue, height 3 feet.

„ *variegata*, foliage golden in early summer.

stylosa, see *unquicularis*.

tectorum (tomilolopha), a rare Chinese species, prefers a dry sunny position, height 1 foot.

„ *alba*, a white-flowered form, height 1 foot.

tridentata (Hookeri), flowers deep-violet, height 1½ foot.

unquicularis (stylosa) light-blue, fragrant, winter-flower-

ing, height 1 foot. Likes a sunny, dry situation.

unguicularis alba, ivory-white.

„ *speciosa*, large flowers, rich-blue.

versicolor columnæ, bright velvety-purple, height 2 feet.

„ var. *Fosteri*, pale-blue, white and yellow at base.

„ *Kermesina*, claret-red, very handsome, height 2 feet.

V.—BULBOUS AND TUBEROUS-ROOTED IRISES.¹

I. alata (*Scorpion Iris*), height 6 to 8 inches, with Leek-like leaves, and pale-blue or lilac flowers. Best grown in pots or in sheltered sunny nooks of rock garden; *alba* and *Leichtlinii* are white and dark-purple forms. Spain and Algeria.

I. atrofusca, S. claret-brown, veined black, F. brown-black, 3 feet.

I. atropurpurea, coppery-maroon, with black sheen, 1 foot.

I. Bakeriana, similar to *I. reticulata*, S. sky-blue, F. white, spotted dark-violet, sweet-scented. Armenia.

I. Bismarckiana (*Sari nazarena*), S. sky-blue, veined purple, F. veined reddish brown-purple on a straw-coloured ground, $\frac{3}{4}$ foot.

I. Boissieri, rich-purple, blotch yellow, 9 inches. June.

I. caucasica, primrose-coloured, with silver-margined foliage, $\frac{1}{2}$ foot.

I. cristata (fig. 560), amethyst-blue, striped orange, fringed. For sunny sheltered banks, rockwork, &c., 3 inches. May.

I. Danfordia, yellow, spotted brown. Dry nooks on rockwork, 3 inches. February. Asia Minor.

I. flavissima Bloudovii, soft-yellow, 9 to 12 inches. May.

I. Gatesii, large flowers of the *Susiana* type, creamy-white, tinged rose, veined and spotted silver, 2 $\frac{1}{2}$ feet. June.

I. Grant-Duffi, sulphur-yellow; may be treated like the Flag Irises.

I. Helenæ (*Mariæ*), large, S. bright-lilac, F. purple, veined black, velvety-black blotch.

I. iberica, handsome flowers, S. satiny-white, veined purple, F. brown-purple, with black blotch, 6 inches.

I. juncea, golden-yellow, one of the most beautiful, height 15 inches. Prefers a warm light soil.

I. Leichtlini, large handsome flowers, bronzy-brown to lilac, height 1 $\frac{1}{2}$ foot.

I. Lorteti, resembles *I. Gatesii*, but with rose-coloured markings, 1 foot. May.

I. lupina (Wolf's Fur Iris), curious greenish-yellow flowers, veined brownish-red, and with a heavy beard, resembling a wolf's fur, height $\frac{1}{2}$ foot.

I. lusitanica, S. and F. yellow, orange blotch, 1 $\frac{1}{2}$ foot.

I. nigricans (Black Iris), purple-black shaded maroon, inside golden-brown.

I. orchoides, golden-yellow, resembles *I. caucasica*, 1 foot. April.

I. persica, white suffused blue, blotched purple and gold, fragrant, height $\frac{1}{2}$ foot.

I. reticulata, deep-violet, blotched golden-yellow, violet-scented, $\frac{3}{4}$ foot. February.

„ var. *Histrio*, bright-blue, blotched golden-yellow, earlier than *I. reticulata*, $\frac{1}{2}$ foot.

„ var. *histrioides*, azure, earlier and larger than *I. reticulata*.

„ var. *major*, a form with broad falls and standards.

„ var. *Krelagei*, purple, blotched yellow, violet-scented, $\frac{3}{4}$ foot.

I. Rosenbachiana, white and rosy-violet, variable, $\frac{1}{2}$ foot.

¹ See Prof. M. Foster's *Monograph of Bulbous Irises*, published by the Royal Horticultural Society, London.

I. sindjarensis, flowers white and azure-blue, crested, like *I. caucasica*, 1 foot. March.

I. Sisyrinchium, small soft-lavender flowers, blotched white, height $\frac{1}{2}$ foot.

I. Susiana (fig. 561), flowers large, blush, tinted brown, with a network of dark lines, height 1 foot. May.

I. syriaca. Flowers large and white in form, somewhat like *I. sindjarensis*.

I. Tingitana, dark to light blue. Falls lilac and white with golden blotch, height 2 feet. May.

I. tuberosa (Snakeshead Iris), velvety violet-black and green, height $\frac{3}{4}$ foot.

I. Vartani, flowers azure-blue, in Nov. or Dec., ht. $\frac{1}{2}$ foot.



Fig. 562.—*Iris xiphoides*.

I. xiphoides (English Iris) (fig. 562), a large species 2 feet high, from the Pyrenees. Flowers blue or white, or parti-coloured. The following are some of the best named varieties:—Blanche Fleur, Graaf Bentink, Grande Celeste, Hypocrates, King of the Blues, Lilacina Mountain of Snow, Ruby.

I. Xiphion (*vulgare*) (Spanish Iris) (see Plate). These flower two to three weeks before the English Iris, and are yellow, blue, white, or bronze-coloured on stiff erect scapes. Very pretty for forcing in pots or for cut flowers. The following are all good and distinct varieties:—Blue Beauty, Carmen, Golden King, Lemon Queen, Louisa, Princess Ida, Snow Queen, The Moor, Thunderbolt.

[F. W. B.]

Isoloma, Tydæa, and Nægelia (fig. 563).—These three genera are somewhat mixed in gardens. They have been intercrossed, and it is difficult to determine to which genus some of the seedlings belong. They all have scaly rhizomes, erect leafy stems, and tubular flowers, usually large and attractive in colour. Many of them bloom during the winter months, at which time they are particularly acceptable,

their bright colours enlivening the houses at a season when flowers are not over-plentiful; they also may be had in bloom during the summer. They are propagated from the scaly rhizomes, from cuttings, and also from seeds.

The established plants should be started into growth early in spring, along with the *Achimenes*, potting them in 8- or 10-inch pots, in sandy



Fig. 563.—*Nægelia amabilis*.

loam, to which has been added some sifted leaf-mould and a little sand, and grown in a temperature of 60° in the night, with a rise of 10° by day, in a light position. As the season advances give more heat; and when they come into bloom, those that flower in the summer may be removed to the conservatory, where they will continue in flower for some time. Such as are wanted for autumn and winter flowering should be started in May, and grown on slowly in gentle heat. Towards the close of the summer when showing flower they must be kept in a temperature of from 60° to 70°, with all the light possible, and then they will go on blooming for a considerable time; manure-water should be given once a week. When at rest they may be stored with the *Achimenes*. The following is a list of the best varieties:—

(*Isoloma*).—*Amabile*, *digitaliflorum*, *ellipticum*, *giganteum*, *hybridum*, *Lindenii*.

(*Tydea*).—*Belzebuth*, *Gigantea*, *Jeanne Hachette*, *Mde. de Sevigne*, *Mde. Heine*, *Mde. Lavallée*, *Mde. Monte-*

flore, *Moliere*, *Robert the Devil*, *Socrates*, *Tananarive*, *Tricolor*.

(*Nægelia*).—*Amabilis* (fig. 563), *fulgida*, *Massinet*, *Pegase*, *Rosine*, *Saint-Saens*, *Sophia*, *zebrina*.

Kniphofia (*Tritoma*).—A genus of highly ornamental plants, numbering about forty species, chiefly natives of South Africa, and a large number of garden hybrids. They are not exacting in their cultural requirements, a light sandy soil, plenty of water when growing, with an annual mulching of well-rotted manure, and a sunny position, affording all they need to keep them in permanent health. Coming, as they do, from a warmer country than this, they naturally require a little protection in the winter, which is easily afforded by covering the crowns with a cone of cinder ashes or dry leaves.

For large groups on lawns, or by the side of pond or lake, they are most effective, producing their tall spikes of yellow and orange-scarlet flowers in profusion in autumn. They are also excellent plants for the mixed border. The smaller species and varieties are suitable for the rock garden.

Those which have no stem above-ground are propagated by division in spring when new leaves are being pushed up. Those that have an arborescent stem may be made to yield stock by cutting off the head of leaves, when a large number of shoots will be produced from the base of the plant. These can be taken off as cuttings, potted in a sandy compost, and kept in a close frame for a time, when they readily take root.

K. aloides.—One of the first to be introduced into this country, and one of the parents of many fine hybrids. The best of the varieties are *maxima* (*grandis*) (fig. 564), taller than the type, with longer heads and larger flowers. Introduced from the Orange Free State in 1862. *Var. nobilis* often attains a height of 7 feet, and has orange-red flowers. *Var. præcox*, intermediate between *K. aloides* and *K. Rooperi*; often in flower in May. *Var. serotina*, a late form with yellowish flowers. *Var. longiscapa*, a fine variety with long flower-heads.

K. breviflora.—A small plant allied to *K. modesta*. Introduced from Natal in 1895. Leaves 1 to 2 feet long, dull-green and keeled. Flower-spike 2 feet, bearing a dense raceme 3 to 4 inches long of bright-yellow flowers.

K. Burchelli.—A Cape species, with bright-green leaves 2 to 3 feet long, tapering to a point. Flower-spikes as long as the leaves, with dense heads 3 to 4 inches long, the upper portion bright-red, the lower yellow.

K. caulescens.—Stem stout, a foot or more long. Leaves rather broad, 2 to 3 feet long, glaucous, keeled. Spike stout, branched; heads 4 to 8 inches long; flowers curved, an inch long, deep-red, afterwards yellow. Less hardy than some, but will stand in a well-drained sunny position in the rock garden.

K. comosa.—Smaller than *K. aloides*, with narrow, three-cornered leaves in dense rosettes, erect, bright-green. Flowers drooping, in dense oblong heads, canary-yellow, with bright-red stamens. Abyssinia.



Fig. 564.—*Kniphofia maxima (grandis)*.

K. foliosa (Quartiniana).—One of the most robust. Leaves 4 inches wide, green, with rough edges. Flower-spike stout, 2 to 3 feet high, bearing a head nearly a foot long, densely packed with bright-yellow flowers tinged with red. Abyssinia.

K. Leichtlini.—Leaves wide at the base, 3 to 4 feet long, bright-green. Flower-spike 3 to 4 feet long, with heads of pendent, bell-shaped, dull-red flowers; stamens and styles slightly exserted. Introduced from Abyssinia in 1880. Var. *distachya* is a more robust form, with smaller lemon-coloured flowers.

K. longicollis (primulina).—Dwarfer than *K. aloides*, the leaves long, narrow, and flaccid; the flower-spike 3 feet high, bearing a raceme a foot long of bright canary-yellow flowers. Should be grown under glass, as it flowers in mid-winter.

K. Macowani (fig. 565).—A dwarf species and a general favourite. Suitable for the rockery. The short stem is covered with the remains of the old leaves. Flower-spikes 1 to 2 feet high, bearing dense heads, 2 to 6 inches long, of reflexed, bright orange-red and yellow flowers. A handsome hybrid between this and *K. aloides* is called *corallina*.

K. modesta.—Like *K. pallidiflora*. Leaves linear, pale-green, 2 to 3 feet long. Flower-spike slender, 2 feet high, bearing a loose cylindrical raceme of white funnel-shaped flowers 6 to 12 inches long.

K. natalensis.—A tender species from Natal which requires cool greenhouse treatment. Flower-spike 2 to 3 feet high, with loose heads of orange-red flowers, changing to a yellowish colour with age.

K. Nelsoni.—A recent acquisition and one of the best. Leaves slender, 18 inches long. Flower-spike rising above the leaves and bearing cylindrical heads of brilliant orange-scarlet deflexed flowers.

K. Northia.—Allied to *K. caulescens*, but with much broader leaves, which are not keeled. Should be planted in a warm corner, and protected in winter. Stem stout. Leaves glaucous, tapering from a 6-inch base to a long narrow point, finely serrated. Flower-spike stout, short, with dense heads of dull-yellowish flowers, the upper ones flushed with red. Found near Grahamstown, and introduced by Miss North.

K. pallidiflora.—Dwarf with white flowers, requiring a warm greenhouse.

K. pauciflora.—A small plant. Leaves few in tuft and keeled. Racemes lax, with drooping pale-yellow funnel-shaped flowers. Doubtfully hardy; should be planted against a warm wall.

K. pumila.—A handsome Cape species distinguished by its distichous leaves and short cup-shaped flowers. Flower-spike stout, bearing heads of orange-red flowers.

K. Rooperi.—Near *K. aloides*. Leaves broad, glaucous. Spike stout, with dense heads of orange-red flowers, becoming yellow with age. Produced in summer.

K. rufa.—Allied to *K. laxiflora*, but with shorter smooth-edged leaves; flowers shorter, with exserted stamens; racemes lax, 4 to 6 inches long, with primrose-yellow flowers, the upper ones tinged with red. Natal.

K. sarmentosa.—Distinguished from *K. aloides* by its



Fig. 565.—*Kniphofia Macowani*

smaller glaucous leaves with smooth edges and keel. Spike 2 to 4 feet, with heads of flowers which are red above and yellow below.

K. Tuckii.—Nearly allied to *K. pumila*, but more robust in habit. Leaves densely tufted, reflexed, 2 feet long, with a serrulate margin. Raceme 6 inches long, densely packed with deflexed sulphur-yellow flowers, tinged with red in an early stage.

The best of the hybrids and seedlings, raised chiefly by Herr W. Pfitzer of Stuttgart, are:—

Augustin Wilhelm, Director Göthe, Director Stoll, Franz Buchner, George Bruant, Henry Cannell, Hofgärtner Fiesser, Hofgärtner Ehmann, Hofgärtner Singer, Jules Chrétien, Victor Lemoine, W. E. Gambleton, Wilhelm Pfitzer.

Lachenalia.—A genus of South African bulbous plants, closely related to *Hyacinthus* and *Muscari*; indeed they are popularly known as Cape Hyacinths. There are about forty species, but only a few of these are worthy of consideration as garden plants. These are described below. They all have egg-shaped Scilla-like bulbs, fleshy strap-shaped deciduous leaves, and elegant, more or less erect scapes of tubular flowers. Several hybrids and seedlings of garden origin also add to the value of the genus horticulturally. One of the best of these, *L. Nelsoni*, was named after the raiser of the first hybrid Lachenalia—viz. the Rev. John Nelson, whose operations on the genus were commenced about twenty-five years ago. Seedlings have also been raised by Mr. Moore in the Botanic Gardens, Glasnevin.

Cultivation.—The bulbs require a season of rest after the flowering season, which extends from January to May, this rest being afforded by placing the pots of bulbs in a sunny frame or on a shelf in a greenhouse and withholding water. Early in August the bulbs should be shaken out, sorted, and repotted in a compost consisting of loam two parts, leaf-mould one part, a small quantity of well-rotted manure or bone-dust, and some sand. If it be grown in pots, 5-inch is a convenient size, planting from six to ten bulbs in each pot. The small bulbs may be planted rather thickly in pans as stock. Baskets are also suitable for Lachenalias (see fig. 567). The baskets, about a foot in diameter, should be lined with sphagnum, and the bulbs put in as the soil is filled in. If properly planted the bulbs need not be taken out of the baskets for three or four years. After potting, they may be placed in a frame or on a greenhouse shelf, and the soil kept moist, but rather on the dry side, until the leaves are well up. During winter the ordinary greenhouse temperature, minimum 45°, suits them. Vigorous plants should be fed with weak liquid manure, or a weekly top-dressing of Clay's Fertilizer, until

the leaves show signs of fading. In May the pots may be replaced in the frame, and kept dry until repotting-time in August.

Seeds are readily matured by Lachenalias if the flower-spikes are allowed to remain. They should be sown as soon as ripe, when they are shining black, and they germinate freely in a temperature of about 60°. As soon as the seedlings can be handled they should be pricked out

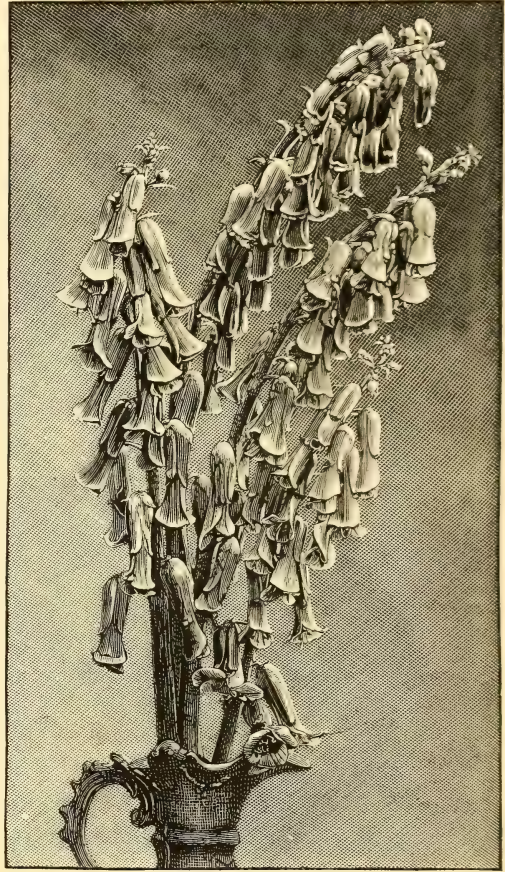


Fig. 566.—*Lachenalia Nelsoni*.

in pans or boxes, and grown on in a sunny position under glass. They usually flower when three years old.

The following are good garden plants:—

L. aurea.—The best form of this, named *gigantea*, has stout, erect spikes, 18 inches high, bearing about twenty-five flowers, each 1½ inch long, rich golden-yellow fading to a dull-purple colour; leaves 12 by 2 inches, glaucous-green with blotches of a darker shade. The type is a small plant with spikes 6 inches high.

L. Cami.—Leaves 9 inches, shining green, mottled dull-brown; spike erect, a foot long, heavily blotched, and bearing from twelve to twenty flowers, ¾ inch long, orange-yellow tinged with green; buds bright-red. A seedling of garden origin.

L. glauca.—Leaves a foot long, tapering, bright-green heavily spotted with brown; spike erect, a foot or

more long, bearing numerous inflated, short yellow-green and white flowers.

L. Nelsoni (fig. 566).—A hybrid between *L. tricolor* and *L. aurea*, and possessed of the good qualities of both. It grows freely, produces stout, erect spikes a foot or so high of rich-yellow flowers, the buds at the top crimson.



Fig. 567.—*Lachenalia tricolor*, in basket.

L. orchoides.—Similar to *L. glauca*, but the flowers are smaller and more or less blue in colour on scapes a foot long.

L. pendula.—Remarkable for its large bulbs, brittle, green, infolded leaves, and vari-coloured flowers. The scape is from 12 to 18 inches high, $\frac{1}{4}$ inch in diameter at the base, bearing a dozen or more flowers each from 1½ to 2 inches long, coloured orange-red with purple and emerald-green tips. In some forms the flowers are mottled, in others the purple is wanting. It is quite distinct from *L. tricolor*, and is probably the *L. aureliana* of some gardens.

L. tricolor (fig. 567).—The commonest of all Lachenalias, and a most useful plant when properly grown. There are several varieties of it, namely *luteola*, *aurea*, *quadricolor*, and *Warei*, distinguished by differences in coloration of the flowers. The type has fleshy green mottled leaves a foot long and up to 2 inches wide, a scape a foot high, bearing from twelve to twenty tubular flowers an inch long, coloured red, yellow, and green.

Lilium.¹—The genus *Lilium* is widely distributed over the southern portion of the continents of Europe, Asia, and America, their presence on the latter continent being limited to the southern half of North America. Of

these three regions Asia has the greatest number of species; Europe the next; America, if we take into consideration its vast area, ranking last. To Asia also we are indebted for our most magnificent species, whilst, as a general rule, European Lilies are most amenable to cultivation, North American next, and Asiatic last. With the exception of a few from India, all Lilies are hardy in the United Kingdom, a late spring frost doing infinitely more damage to them when in growth than a very severe winter. One so often hears it doubted that such species as *L. Browni*, *L. Hansoni*, *L. giganteum*, *L. longiflorum*, *L. Henryi*, *L. Martagon*, *L. album*, &c., can be cultivated with success in the open border that it is necessary to emphasize the fact of their hardiness.

The following is taken from "A Conspectus of the Genus *Lilium*", by Professor F. A. Waugh, pub-

lished in the *Botanical Gazette*, Chicago, vol. xxvi. (1899).

"It is now a quarter of a century since Mr. J. G. Baker, of Kew, made his monograph, and twenty-two years since Mr. Elwes published his monumental work on Lilies. Since that time many new species have been added to the list, and some fresh light has been thrown on such as were imperfectly understood before.

"In the following list I have numbered sixty-four species, which, with their varieties, stand as follows:—

Sub-genus I, Eulirion.—*L. candidum*; *L. Delavayi*; *L. japonicum*, vars. *Alexandree*, *Browni*, *roseum*; *L. longiflorum*, var. *eximium*; *L. Lowii*; *L. neilgherrense*; *L.*

¹ A paper, with alterations and additions, by Mr. R. W. Wallace, of Colchester, published in the *Journal of the Royal Horticultural Society* in November, 1900.

nepalense; *L. Parryi*; *L. philippinense*; *L. primulinum*; *L. rubellum*; *L. sulphureum*; *L. Wallichianum*; *L. Washingtonianum*, var. *purpureum*; *L. yunnanense*.

Sub-genus II., Isolirion.—*L. Bakerianum*; *L. bulbiferum*; *L. Catesbei*; *L. concolor*, vars. *parthenion* (*L. coridion*), *pulchellum*, *sinicum* (*Buschianum*); *L. croceum*; *L. Davidi*; *L. elegans*, vars. *alutaceum*, *atrosanguineum*, *bicolor*, *fulgens* (*Batemanniae*), *plenus*, *Wallacei* (*L. Wal-*

note the large number of species added from China. In so far as these have come into cultivation, they are very acceptable acquisitions (e.g., *L. Henryi*). It will be seen that there is a considerable number of species still to be introduced to cultivation. When we get them all a-thriving in our gardens, what a show they will make!"

Lilies are found wild in many countries and under widely different conditions; and to obtain success in the garden with them we must as far as possible imitate these conditions. On the whole they may be classed as woodland plants, more especially those of North America and Japan: in the former country they are found growing in large open glades and on wooded hillsides, the undergrowth protecting them from cold winds and early frosts, and the trees during the summer screening them from the hot sun and giving that coolness and partial shade which they so much enjoy. In Japan they grow on the sides of wooded hills and slopes in pockets of rich soil washed down from the hills and generally near small streams. There is no doubt that Lilies succeed best in this country when planted in partial shade and surrounded with a cool, moist atmosphere; but they must not be planted directly under trees nor in total shade. They require some sun, but not the hot midday sun. An ideal spot for them would be an open forest glade with a small stream running through it, near the banks of which the North American peat and moisture-loving species would flourish, and higher up, away from the water, such species as *L. auratum*, *L. Washingtonianum*, *L. Humboldtii*, and *L. giganteum* would readily grow.

It is difficult to lay down hard-and-fast rules as to the best positions in which to plant Lilies, the same variety flourishing equally well under totally different conditions; but a few general directions may be helpful:—Positions exposed to cold sweeping winds should be avoided. Never plant directly underneath trees, but if possible at some little distance away, so that the trees will afford some shade. A hot dry corner, or a cold wet heavy soil, or where the soil is water-logged are unsuitable. If planted near a large expanse of water the young growths will need protection from late spring frosts. *L. Henryi*, *L. auratum*, *L. longiflorum*, and *L. speciosum*, are specially liable to injury from this cause. In beds of *Rhododendron* or other low-growing shrubs they always do well, and in no position do they show up more effectively. The beds at Kew



Fig. 568.—*Lilium auratum*.

lacei); *L. formosum*; *L. medeoloides*; *L. myriophyllum*; *L. philadelphicum* (*L. dauricum*).

Sub-genus III., Archelirion.—*L. auratum*; *L. Henryi*; *L. oxypetalum*; *L. papilliferum*; *L. speciosum*, vars. *album*, *rubrum*; *L. tigrinum*, vars. *plenesens*, *splendens*.

Sub-genus IV., Martagon.—*L. avenaceum*; *L. callosum*; *L. carniolicum*; *L. chalcedonicum*; *L. columbianum* (*L. parviflorum*); *L. Fargesii*; *L. lankongense*; *L. maculatum* (*L. Hansoni*); *L. Martagon*; *L. Maximowiczii* (*L. Leichtlini* and *L. pseudo-tigrinum*); *L. monadelphum*, var. *Ledebouri*; *L. occidentale*; *L. ochraceum*; *L. pardalinum*, var. *angustifolium* (*L. Roezli*); *L. polyphyllum*; *L. pomponium*, var. *pyrenaicum*; *L. puberulum* (*L. Humboldtii*); *L. setchuense*; *L. superbum*, var. *Carolinianum*; *L. taliense*; *L. tenuifolium*; *L. testaceum*.

Sub-genus V., Pseudomartagon.—*L. Bolanderi*; *L. canadense*, vars. *flavum*, *rubrum*; *L. Grayi*; *L. maritimum*; *L. nitidum*; *L. parvum*; *L. Purdyi*.

Sub-genus VI., Cardiocrinum.—*L. cordifolium*; *L. giganteum*; *L. mirabile*.

"This arrangement of the names is, I think, conservative. No new species have been made, and no new names introduced where it did not seem entirely unavoidable. It is interesting to

near the Palm House are excellent examples of this mode of culture. To recapitulate, the best positions for Lilies are those that afford partial shade, protection from spring frosts and hot midday sun, and coolness and moisture at the root.

Having found the right position the next thing is to see that we provide the best and

verum, *L. rubescens*, *L. speciosum*, *L. Szovitzianum*, *L. Washingtonianum*, and *L. sulphureum*.

Thirdly, those that require peat and moisture are *L. Burbanki*, *L. canadense*, *L. Grayi*, *L. pardalinum*, *L. Parryi*, *L. philadelphicum*, and *L. Roezlii superbum*.

All the species here named can be grown with little trouble. Those in the first list will succeed in any ordinary border under conditions inferior to those already described as essential for perfect cultivation. Those in the second list require a certain amount of partial shade, and coolness at the root, and are suitable for planting in Rhododendron beds, and amongst low-growing shrubs. The third group comprises those that require a cool shady spot such as the edge of a pond or stream or in a woodland glade. In addition to the species already mentioned there are a great number which are capable of successful cultivation with a little extra care.

Autumn is the best time for planting. A Lily when in full growth is performing two functions—one developing by means of its stem the flowers, and the other by means of its basal roots the bulb for next year's growth—so that it requires as much attention to its wants below the ground as above. All Lilies have not the same root action: some make two sets of roots, one from the base of the bulb, the other from the bottom of the stem, whilst others pro-



Fig. 569.—*Lilium Browni*.

duce roots from the base of the bulbs only. These must be well established before they can flower with any degree of success, as unless they are well rooted the stem has nothing to draw from and feed on—except the bulb, which naturally suffers. Those that have two root actions may be planted almost at any time, for as soon as the stem is about 6 inches high roots spring from its base and grow with exceeding vigour, supporting the stem in its development almost independently of the bulb. I have often noticed when lifting *L. auratum* that those bulbs which had plenty of basal roots had new well-formed bulb growth, whereas when it was absent the bulb had flowered by means of the stem roots and then collapsed.

First, any good garden soil of a fair depth, well dug before planting, is suitable for *L. Browni*, *L. candidum*, *L. chalcedonicum*, *L. croceum*, *L. excelsum*, *L. Hansonii*, *L. Henryi*, *L. Martagon* (purple), *L. pyrenaicum*, *L. Thunbergianum*, *L. tigrinum*, and *L. umbellatum*: these will all flourish in a good border with fair treatment.

Secondly, a strong soil such as a good rich friable loam, not too heavy, is preferred by *L. auratum platyphyllum*, *L. Batemannii*, *L. columbianum*, *L. Humboldtii*, *L. Humboldtii magnificum*, *L. Martagon album*, *L. dalmaticum*, *L. pomponum*

verum, *L. rubescens*, *L. speciosum*, *L. Szovitzianum*, *L. Washingtonianum*, and *L. sulphureum*.

The Martagons, *L. chalcedonicum*, *L. Szovitzianum*, *L. dalmaticum*, *L. Humboldtii*, and others

of a similar character only produce basal roots. The root action commences about the middle of October or earlier, and continues during the winter. They should therefore be lifted before root action takes place, as if lifted later the



Fig. 570.—*Lilium giganteum*.

roots get damaged or dried and the plant receives a serious check. There is no doubt that the late planting of Martagon Lilies, after root action has been checked, is often the cause of their failure the first season.

Species with two root actions, viz. *L. umbellatum*, *L. Thunbergianum*, *L. Browni*, *L. Batemanniae*, *L. longiflorum*, *L. speciosum*, *L. tigrinum*, *L. Henryi*, *L. odorum*, *L. Krameri*, &c., do not make such stout basal roots, and do not require such care when being lifted, nor is it necessary to lift them so early; they can be planted any time during the autumn and spring without experiencing any serious check. The stem roots of these Lilies are, so to speak, the main support of the flower-stem, affording it nourishment independently of the bulb. It is most important that they should be kept cool and moist (especially when grown in pots), for if they once get thoroughly dry or scorched by the sun the stem at once suffers, the leaves turn yellow, drop off, and often the whole plant succumbs. This is often the cause of failure in *L. auratum*, which more than any other Lily likes coolness

at the root. For trade purposes it is always best to lift all Lilies as soon as growth is finished, and keep them cool and fresh in a shed or frame: by this means root action is held in check.

Imported bulbs of Japanese Lilies may be planted as late as March and April, provided they are in a fresh and sound condition. They should be put in the soil about three times their own depth: the soil should be well dug, and it is beneficial if a little peat, turfy loam, leaf-soil, and sea or silver sand be added (the sand should be placed all round the bulbs), we use sea-sand largely for this purpose, generally covering the bulb entirely with it. It is always moist, and being of a gritty nature prevents the attacks of slugs and worms, also keeping the soil from setting hard round the bulbs. When planting Lilies amongst Rhododendrons and other shrubs, I would recommend the use of casks cut in half, with the ends knocked out. They can be sunk in the beds and filled with a good mixture of soil, and will serve to keep the roots of the shrubs and trees from interfering with the bulbs. Lilies planted in this manner generally succeed. A little well-decayed manure—cow manure for preference—may be worked in beneath the bulbs when planting, but it must not be used too freely. After planting, the surface of the soil may be covered with ashes to a depth of 3 inches: this serves as a protection in winter. It is preferable to cocoa-nut fibre, which holds moisture and attracts frost.

Lilies generally are successfully grown at Kew. The following is a brief account of the treatment they there receive. Most of the species do well in peat, but a few do better in loam, and some do equally well in either. The species which do best in peat are *L. auratum*; *L. superbum*, grows 7 feet high, with between twenty and thirty flowers on a stem; *L. Grayi*, 5 feet high, with as many as twelve flowers on a stem; *L. concolor* and the variety *coridion*, grows 2 feet high, and bears four to six flowers; *L. speciosum* in all its forms, should be lifted and the bulbs sorted every second or third year; *L. canadense*, forms large masses in two years, the stems 5 to 7 feet high; *L. elegans* and all its forms; *L. Browni* and its varieties; *L. pomponium*, *L. sulphureum*, *L. Lowii*, and *L. longifolium*. These are planted in beds among Rhododendrons, Azaleas, Sedums, Kalmias, Ericas, and other dwarf peat-loving evergreen shrubs, which not only keep the soil cool in summer, but also shelter the young growths from cold winds and frost in spring. It is

advisable to lift both shrubs and Lilies every three years or so, when the soil can be renovated, the shrubs re-spaced, and the bulbs sorted and given a fresh start.

The species which at Kew show a preference for loam are: *L. Martagon* and its varieties, *L. tigrinum*, *L. pyrenaicum*, a chalky soil is best for this; *L. testaceum*, stems 5 feet high; *L. candidum*, never very first-rate in any soil at Kew; *L. pardalinum*, stems 7 feet high, does very

well in loam also; *L. Hansonii*, does not object to a rather dry situation; *L. chalcedonicum*, prefers a strong moist loam, but is not a great success at Kew; *L. croceum*, happiest on a deep moist loam; *L. davuricum*, *L. umbellatum*, a success in any garden soil; *L. Henryi*, although this does well in peat, it grows strongest in loam; *L. Szovitzianum*, happiest in a deep loam with a clayey subsoil.

Propagation by seeds.—Many *Liliums* are short-



Fig. 571.—*Lilium speciosum*.

lived under cultivation, whatever may be their behaviour in a wild state. To keep up a supply of bulbs it is worth while to look after the seeds, and to sow some every year, especially of those species which flower well for a year or two and then fail. The process is simple, all that is necessary being to ensure the setting of a few fruits on the healthiest plants, and to sow the seeds as soon as they are ripe in a pan or box of sandy soil, which should be placed in a frame. When the seedlings have made one leaf, prick them out in a cold frame or partially shaded bed and transplant annually, but do not let the bulbs get dry. In this way large stocks of such species as *L. Henryi*, *L. formosanum*, *L. sulphureum*, *L. nepalense*, *L. superbum*, and others have been obtained.

By scales and bulbils.—The scales of healthy bulbs if removed and placed in pans or shallow boxes of sandy soil in a frame will form tiny bulbs in a few months, which will grow to flowering size in two or three years if planted

out and looked after. Some species, e.g. *L. tigrinum*, *L. sulphureum*, and *L. leucanthum*, develop axillary bulbils, which, if removed and sown in boxes or a cold frame, grow into flowering bulbs in two years. They should be lifted and sorted after the first year's growth.

L. giganteum.—This grand Lily has attracted so much attention of late that a few remarks upon it may not be out of place. It delights in a deep rich vegetable soil, in a position where it has protection from wind and sun. It is perhaps more specially suited for the woodland than any other Lily. Nothing is gained by planting extra large bulbs; smaller bulbs, which establish themselves in a year or two, will throw up their lofty flower-stems in full beauty, whereas a bulb which flowers the season after planting can have nothing like the root action to draw upon.

As pot-plants, for conservatory decoration, Lilies have great value, producing, when well grown, quantities of large well-formed flowers.

The following varieties are most suitable for this purpose:—*L. auratum* and its varieties, *L. speciosum* and its varieties, *L. longiflorum* and its varieties, *L. Hansonii*, *L. tigrinum*, *L. excelsum*, *L. umbellatum*, *L. candidum*, *L. Henryi*, *L. sulphureum*.

The bulbs should be placed in pots about two and a half times their diameter, and 2 inches below the soil. Good turfy loam, peat, and

sand make an excellent compost. Plunge the pots in ashes outside under a wall or in a cold frame, and as soon as root action has well commenced take them into the greenhouse as required. When the bulbs are well rooted care must be exercised in watering, as if once they get dry serious damage is quickly done. Give *L. auratum* plenty of shade and moisture; the variety *platyphyllum* is a noble pot-plant,

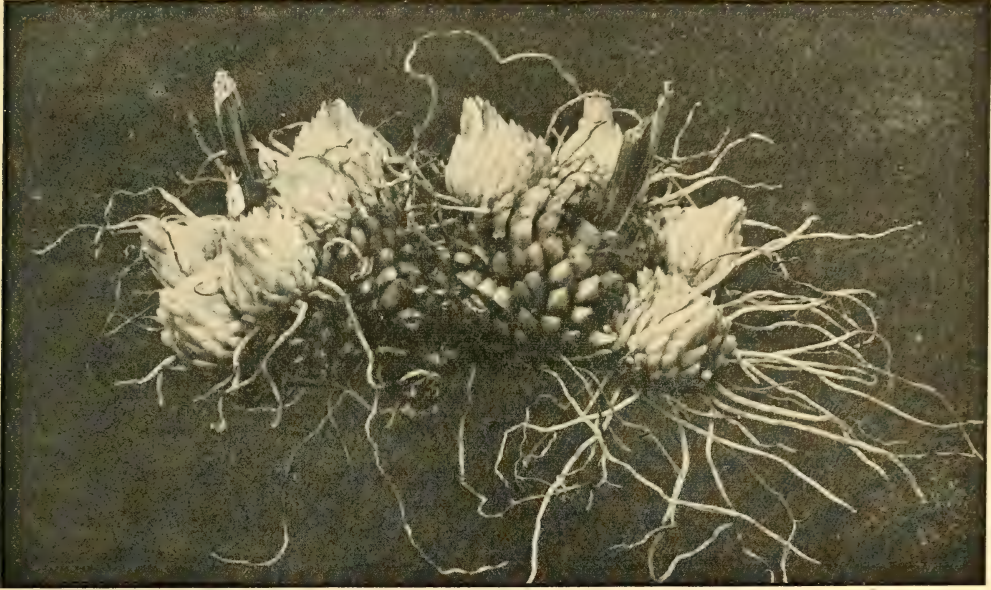


Fig. 572.—Bulb proliferation of *Lilioidium pardalinum*.

and very reliable. After flowering they should be plunged outside in a cool shady border, and when the foliage has quite died down, stored for the winter in a cool frame or outhouse. In early spring they should be repotted or top-dressed with fresh soil.

Another method of cultivating Lilies under glass is that adopted by Mr. G. F. Wilson, of Weybridge, who grows them in pots in an unheated greenhouse. In this way nearly all known varieties can be grown successfully. Protected from wind and wet the flowers are produced in a state of perfect beauty, and, if required, can be taken into the house without cutting the flower stems. In cutting the flowers of Lilies, do not take more of the stem than is absolutely necessary, as the more stem left the better the new bulb growth will be.

Not much improvement has been effected by the hybridization of Lilies. Hybrids have been raised, but as a rule they are inferior to their parents. The species do not readily cross with each other. *L. Dalhousii* and *L. Marhan* are two good hybrids, but still not superior to

their parents; *L. excelsum* or *testaceum* is said to be a hybrid between *L. chalcidonicum* and *L. candidum*, raised by Louis van Houtte, and is decidedly an addition to our gardens; *L. kewense*, a hybrid between *L. Henryi* and *L. leucanthum*, is a new and interesting Lily of Kew origin, and which bears some resemblance to a pale form of *L. auratum*. It is rather remarkable, considering what an advance has been made in the improvement of so many garden plants by cross-breeding, that so little has been accomplished with *Lilium*. It almost seems as if nature was satisfied with her own work, and objected to have it improved by man.

Few new Lilies have been introduced to cultivation of late years as compared with twenty years ago, and of the few *L. Henryi* stands first. This has proved to be a thoroughly good doer under all conditions. *L. sulphureum* (*Wallichianum superbum*), from Burma and China is another grand hardy Lily. *L. Lowii*, also from Burma, has a good constitution. *L. rubellum*, very distinct and pretty, has on the whole been disappointing. Dr. Henry has found several

new Lilies, in addition to his namesake, some of which, in the way of *L. Browni*, have flowered at Kew. Two or three distinct new species have also been found in California.

Lilies are now an important article of commerce, hundreds of thousands reaching this coun-



Fig. 573.—*Liliun Dalhansonii*.

try every year from Japan and Bermuda, to say nothing of the thousands that are shipped to the United States. From Bermuda something like two million bulbs, worth about £15,000, are annually exported, whilst from Japan last year some four or five million bulbs of *L. longiflorum* were exported; these would be worth £25,000 or more. These are nearly all forced for the various flower-markets during the spring and early summer, chiefly for Easter. One large grower for Covent Garden cut 1400 dozen blooms during one Easter week. Hundreds of thousands of *L. auratum*, *L. speciosum*, and several others are annually exported from Japan; and many thousands of North American species are annually sent to Europe.

The species and varieties in cultivation are:—

L. Alexandræ.—Flowers up to five on a stem, large, pure-white, widely expanded, of great substance. Japan.

L. auratum (fig. 568).—This magnificent Lily is so well known that it needs no description. No garden or greenhouse is complete without it. Japan.

L. auratum, var. *pictum*, a fine, bold, beautifully-spotted variety, with crimson-tipped petals.

L. auratum, var. *platyphyllum* (*macranthum*).—The largest and best of the forms of *L. auratum*. Stems stout, leaves very wide. Its enormous flowers often exceed 12 inches in width, richly spotted. A form called *virginale* has a golden band down the centre of each petal, which is slightly spotted with yellow.

L. auratum, var. *rubro-vittatum*, a magnificent red-banded variety.

L. auratum, var. *Wittei*, a beautiful variety with white unspotted flowers with a central band of yellow, the ends of the petals in some cases tinged with reddish-brown.

L. Batemannia.—A form of *L. elegans*. Colour rich-glowing apricot, unspotted, four to six flowers in an umbel. Japan.

L. Bolanderi.—Stems 1½ foot, flowers like *L. Grayi*, deep-crimson, with dark spots. California.

L. Browni (fig. 569).—One of the finest; immense trumpet-shaped flowers. Inside pure-white with brown anthers, exterior deep reddish-brown. Japan.

L. bulbiferum.—An old favourite, with bulbils in the axils of the leaves. Flowers red. Japan.

L. Burbanki.—A hybrid between *L. pardalinum* and *L. Washingtonianum*, said to be very vigorous and free-flowering; colour of flowers orange-yellow with purple spots.

L. callosum.—Slender stems, about 2 feet high, carrying numerous pendulous orange-red flowers. Japan.

L. canadense.—Quite distinct from *L. superbum*. Flowers varying from yellow to orange, bell-shaped, heavily spotted inside, very graceful and pretty, likes plenty of moisture. N. America.

L. canadense, var. *flavum*.—Golden-yellow, thickly spotted with purple.

L. canadense, var. *rubrum*.—Exterior red, interior yellow, spotted black.

L. candidum.—The beautiful common white Madonna Lily. Europe, &c.

L. carniolicum.—Very early, flowers red, recurved like *L. chalcidonicum*. S. Europe.

L. chalcidonicum.—The old scarlet Martagon or Turk's cap. One of the most beautiful, with slender stems, each bearing from five to eight flowers of an intense scarlet hue. S. Europe.

L. columbianum (*nitidum*).—Bright golden-yellow, spotted red; tall and graceful, like a small *L. Humboldtii*. N. America.

L. concolor (*sinicum*).—Bright-scarlet, with dark-red spots; dwarf; each bulb produces several stems. China.

L. concolor, var. *coridion*.—Flowers citron-yellow.

L. cordifolium.—The dwarf variety of *L. giganteum*; white flowers. Japan.

L. croceum.—The beautiful orange Lily. S. Europe.

L. Dalhansonii (fig. 573).—A hybrid between *L. Hansonii* and *L. dalmaticum*; height 5 feet, bearing numerous flowers of a dark-brownish purple.

L. dauricum.—Often confounded with *L. umbellatum*; a very pretty Lily; flowers three to six in an umbel. yellow flushed with red, black spotted. Dahuria.

L. elegans (*Thunbergianum*).—A splendid group of dwarf early-flowering Lilies belong to this species. They have stems from 1 to 2 feet high, producing upright cup-shaped flowers of large size and brilliant colour. Planted in groups amongst low-growing shrubs, the effect is most telling, whilst as pot-plants for the conservatory they are invaluable. A strong bulb will produce three or four stems carrying from three to five flowers on each. Japan.

L. elegans, var. *Alice Wilson*.—Clear lemon-yellow.

L. elegans, var. *atrosanguineum*.—Stem bearing five or six large deep-red, black-spotted flowers.

L. elegans, var. *aurantiacum verum*.—Citron-yellow.

L. elegans, var. *bicolor*.—Orange-red, splashed with yellow.

L. elegans, var. *brevifolium*.—Orange-red, early.

L. elegans, var. *flore pleno*.—Deep-red, semi-double.

L. elegans, var. *Horsmani*.—Rich-crimson; finest variety.

L. elegans, var. *marmoratum aureum (robustum)*.—Tall, orange-yellow with crimson spots, early; one of the best.

L. elegans, var. *Orange Queen*.—Stems a foot high, bearing one to three flowers, bright-orange with dark spots.

L. elegans, var. *ornatum*.—Early, flowers large, well-shaped, bright orange-yellow spotted black.

L. elegans, var. *Prince of Orange*.—Apricot-yellow.

L. elegans, var. *Van Houttei*.—Grand form, crimson; one of the finest.

L. elegans, var. *venustum*.—Late, clear orange-yellow.

L. elegans, var. *venustum macranthum*, bright clear-orange, large flower, very fine.



Fig. 574.—*Lilium longiflorum* Wilsoni.

L. elegans, var. *Wilsoni*.—Two feet high, large erect flowers, apricot colour, purple-spotted, yellow streak.

L. giganteum (fig. 570).—A noble Himalayan Lily, which, when well established, grows 10 feet high, bearing numerous long tubular white flowers, streaked outside with purple; very handsome foliage; quite hardy.

L. Grayi.—In the way *L. canadense*; flowers bell-shaped, dark rich red, spotted purple; free. N. America.

L. Hansonii.—Stems 3 to 4 feet high, bearing numerous massive flowers of a rich golden yellow, heavily spotted black; very early; one of the finest Lilies. Japan.

L. Henryi.—Too much cannot be said in praise of this Lily; its constitution is robust, it is very free flowering, its stems reaching 6 feet or more in height, and bearing over twenty flowers, which are rich-yellow, the foliage deep-green. China.

L. Humboldtii.—Tall growing; producing when well established twenty to thirty flowers, coloured golden, yellow spotted with purple. California.

L. Humboldtii, var. *Bloomerianum*.—Golden-yellow, tips of petals stained purple, large spots.

L. Humboldtii, var. *magnificum*.—Rich-yellow, heavily spotted.

L. japonicum Colchesteri (odorum).—This grand Lily is often confused with *L. Browni*, from which it is quite distinct; it bears large trumpet-shaped flowers, which, when first open, are of a pale-yellow, fading to a creamy-white; the outside is streaked irregularly with reddish-brown; it is also deliciously fragrant. Japan.

L. Kramerii.—A beautiful pink Lily, quite unique in colour. There is a form of it which bears six or more flowers, somewhat in the way of *L. Batemanniae*; very distinct and free. Japan.

L. Leichtlinii (Maximowiczii).—Very beautiful and graceful; citron-yellow, thickly spotted purple. Japan.

L. longiflorum.—Stems 2 or 3 feet high, carrying six to ten flowers of great substance and purity, lasting a long time when cut. China and Japan.

L. longiflorum, var. *Harrisii* (The Bermuda Lily).—Enormous bulbs, 10–12 inches in circumference; producing several spikes of very large flowers.

L. longiflorum, var. *præcox*.—Dwarf and early.

L. longiflorum, var. *takesima grandiflorum*.—Distinct, with stiff foliage and dark-brown stems, bearing from six to ten long white tubular flowers, tinged with brown externally; a splendid variety.

L. longiflorum, var. *Wilsoni* (fig. 574).—The finest of the

group; flowers 8 to 10 inches in length and 4 to 6 inches across, with broad dark-green foliage.

L. Lowii.—Stems 2 to 3 feet high, bearing from two to five bell-shaped white flowers, spotted with dull-crimson; the markings vary. Burma.

L. Marhan.—A hybrid between *L. Martagon album* and *L. Hansoni*; stems 5 to 7 feet, free-flowering; flowers with thick petals, orange, with red-brown streaks.

L. maritimum.—A beautiful small Lily, with the habit of *L. parvum*, but much darker in foliage, and bearing fifteen to twenty campanulate flowers, coloured red spotted with purple. California.

L. Martagon.—Strong-growing, producing twenty to thirty light-spotted purple flowers. S. Europe.

L. Martagon, var. *album* (White Martagon).—One of the finest Lilies, stems 4 to 5 feet high, carrying twenty to thirty pure wax-white flowers.

L. Martagon, var. *dalmaticum*.—Stems 5 to 6 feet high, producing from twelve to twenty-five flowers, varying in colour from light- to dark-purple; quite distinct. *Catani* is a form with very dark crimson flowers.

L. neilgherrense.—Pale sulphur-yellow, very fragrant, late; requires greenhouse culture. India.

L. nepalense (fig. 575).—Flowers funnel-shaped, golden-yellow, tinged with deep purple inside at the base, and often marked with scattered dots. Burma and China.

L. pardalinum.—A magnificent Lily; stems 4 to 7 feet high, bearing twelve to thirty flowers, colour bright-orange, spotted with dark-crimson. California.

L. pardalinum, var. *Bourgeai*.—Like the last, but much deeper in colour, strong-growing, 6 feet high.

L. pardalinum, var. *californicum*.—Stem slender, 3 to 4 feet high; flower deep-orange, spotted maroon; tips of petals bright-scarlet.

L. pardalinum, var. *Johnsoni*.—A new variety, with richly-coloured, prettily-spotted flowers.

L. pardalinum, var. *Michauxii*.—A very free late-flowering form, with finely-coloured blooms.



Fig. 575.—*Lilium nepalense*.

L. pardalinum, var. *minor*.—An early form, with numerous small orange flowers, spotted black; tips of petals in some cases stained crimson.

L. Parryi (fig. 576).—A beautiful Lily with citron-yellow fragrant flowers, spotted with chocolate-brown; it likes peat and moisture. California.

L. parvum.—A graceful Lily, attaining a height of 5 feet,



Fig. 576.—*Lilium Parryi*.

bearing numerous well-shaped canary-yellow flowers, shading to red. California.

L. philadelphicum.—Stem bearing two to five flowers, cup-shaped, base of petal yellow, maroon-spotted, tips of petals bright-scarlet. N. America.

L. philippinense.—Flowers large pure-white, similar to *L. longiflorum*, deliciously scented, the foliage narrow and long; greenhouse. Philippines.

L. pomponium.—Bright-scarlet, much admired for its rich colour, graceful shape, and slender foliage, quite equal to *L. chalcedonicum*. Siberia.

L. pulchellum.—Allied to *L. concolor*, bearing upright crimson flowers, spotted black. Dahuria.

L. pyrenaicum.—Very early, yellow flowers, heavily spotted black, strong scent. Pyrenees.

L. Roetzii.—Stems 2 to 3 feet with scattered linear foliage, the flowers arranged in a raceme some five to ten in number, orange-red, purple-spotted. N. America.

L. rubellum.—A charming little Lily, related to *L. Kraemeri*; stems 1 to 2 feet high, bearing one to four elegant rosy-pink bell-shaped flowers with yellow anthers. Japan.

L. speciosum (fig. 571).—One of the most popular, succeeding admirably in the open border or in pots, producing quantities of flowers, lasting well into the autumn, when nearly all other Lilies are over. Japan.

L. speciosum, var. *album*.—Pure-white, exterior red.

L. speciosum, var. *album Kraetzleri*.—Pure-white.

L. speciosum, var. *album novum*.—Flowers large, white, anthers golden-yellow; greenhouse.

L. speciosum, var. *compactum*.—Buds and flowers very highly-coloured externally, foliage dark-green.

L. speciosum, var. *eruentum*.—A dwarf *Melpomene*, very highly coloured, late.

L. speciosum, var. *macranthum*.—Large, deep-rose.

L. speciosum, var. *Melpomene*.—Strong and free, crimson-purple, heavily spotted and margined white.

L. speciosum, var. *nanum*.—Late, dwarf, foliage drooping, flowers soft-rose.

L. speciosum, var. *punctatum*.—White, spotted and shaded pink.

L. speciosum, var. *roseum*.—White, spotted rose.

L. speciosum, var. *roseum formosum*.—Distinct, the whole flower being of a lovely soft-rose shade; foliage and stem light-green.

L. speciosum, var. *roseum superbum*.—Like *Melpomene*, but with green stem; flowers large, of great substance and perfect shape.

L. speciosum, var. *rubrum*.—White, spotted crimson.

L. sulphureum (*Wallichianum superbum*) (fig. 577).—A grand Lily; tall, with very large tubular flowers, cream-

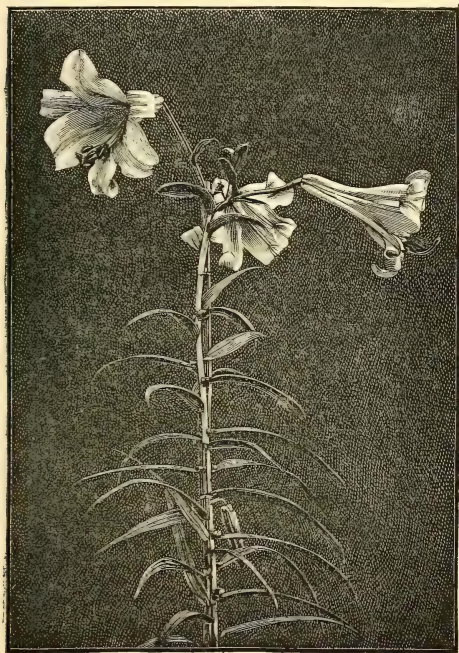


Fig. 577.—*Lilium sulphureum*.

yellow inside, tinted rosy-brown outside. Easily cultivated, and is very prolific, producing small bulbs at the base of the leaves as in *L. tigrinum*. Does well in pots.

L. superbum.—Stem 6 to 7 feet high when established, and producing twelve to thirty bright orange-crimson, recurved, heavily spotted flowers; prefers a moist situation. N. America.

L. Szovitzianum (*colchicum*).—One of the finest Lilies; colour a rich citron spotted with black, anthers chocolate-brown; the flowers are large, and are arranged like so many pendulous bells around a graceful stem, which frequently attains a height of 5 feet, with as many as thirty flowers on it. One of the earliest to bloom. Caucasus.

L. tenuifolium.—Graceful slender stems, bearing many bright-scarlet flowers; early. Dahuria.

L. testaceum (*excoelsum*).—A stately Lily, 4 to 5 feet high, bearing six to twelve flowers of a beautiful nankeen-yellow shade; perfectly hardy, very free-blooming; one of the best. Japan.

L. tigrinum (*sinensis*).—The fine old Tiger Lily. Japan.

L. tigrinum, var. *flore pleno*.—The old double Tiger Lily.

L. tigrinum, var. *Fortunei giganteum*.—This has pyra-

midal spikes 6 feet high, carrying in many cases fifty flowers of grand colour.

L. tigrinum, var. *splendens*.—Has the finest flowers, largest spots, and is more highly coloured.

L. umbellatum.—An early free-flowering species, with tall stems and large heads of orange-red flowers, very free and easily grown. Dahuria.

L. umbellatum, var. *erectum*.—Red, flushed orange.

L. umbellatum, var. *grandiflorum*.—Flowers orange-red.

L. umbellatum, var. *incomparabile*.—Scarlet, very fine.

L. umbellatum, var. *Sappho*.—Light-orange, flushed red.

The following are said to be the result of crossing *L. umbellatum* with *L. Thunbergianum*:—*Aurantiaecum*, bright-orange, flushed with red; *Cloth of Gold*, strong spike, light golden-yellow; *Pietum*, in the way of *elegans bicolor*; *Sensation*, a splendid large flower.

L. Wallacei.—A splendid late-flowering Lily, each bulb producing three to five stems of rosy apricot-tinted flowers, thickly spotted. Invaluable as a pot-plant; likes moisture. (A form of *L. elegans*.)

L. Washingtonianum.—A distinct species, producing long panicles of flowers, which have widely-expanded petals, white, shading off to lilac, fragrant. California.

L. Washingtonianum, var. *purpureum* (*rubescens*).—Flowers opening white, changing to a delicate purple.

Narcissus.—A well-defined genus of hardy bulbous plants, mostly natives of western Europe, and much cultivated and improved during recent years. The best and freest-flowering kinds have been so extensively grown in the Scilly Islands and in Cornwall, as also in Lincolnshire, near London, and elsewhere, as to have become of considerable economic importance, both bulbs and cut-blooms having been very remunerative to market-gardeners, florists, and others. Immense quantities are also grown in Ireland, where the rich deep soils and moist and genial winter climate is specially suitable to their healthy growth and early flowering.

Their flowers are solitary, or clustered several together on their fluted stalks, and are in the main yellow or white in colour; but some of the more recent seedlings and hybrids have red-orange or fiery-tinted cups or "crowns", which add much to their decorative value.

Until quite recently but little colour except yellow could be found in the trumpets of the Ajax or Daffodil section of the genus; but a variety named "Apricot", raised by M. M. de Graaff of Leyden, Holland, has a trumpet of a soft, reddish-buff tint, and is looked upon as an augury of more intensely coloured trumpets in the near future. There is one seedling, viz. "Red Coat", that has a flush of orange-red in the perianth, this being the first indication of the kind.

About twenty distinct species are now recognized, but the number of really hardy, free-growing, and free-blooming kinds, producing

showy flowers, is limited to a third of that number. There are practically speaking only six true species of *Narcissus* and their hybrid progeny which lend themselves to ordinary open-air or garden cultivation. These are *N. Pseudonarcissus*, *N. poeticus*, *N. Tazetta*, *N. Jonquilla*; and in a lesser degree, *N. triandrus* and *N. Bulbocodium*. By crossing the Daffodil with the purple-ringed *Narcissus* (*N. poeticus*), we obtain

all sorts of star *Narcissi*, viz. *N. incomparabilis*, *N. Barri*, and *N. Burbidgei*, &c., in all their numerous forms and phases.

Again, the Daffodil and *N. Tazetta* give the varieties named *N. tridymus*; and the Daffodil and *N. Jonquilla*, all the phases of the so-called *N. odoratus*.

As affording some idea of the importance attached to the *Narcissus* in recent years, we



Fig. 578.—*Narcissus* naturalized on bank of stream.

may allude to the three or four special *Narcissus* Conferences and Exhibitions held by the different Horticultural Societies in London and Birmingham, and to the permanent *Narcissus* Committee of the Royal Horticultural Society in London.

Cultivation.—Most of the garden varieties are of easy culture, growing well in any good garden soils, in beds, borders, or on outlying parts of the lawn or pleasure-grounds, where the grass is not cut until their leaves have had time to ripen off in June.

The best, hardiest, and most showy or ornate of the species are *N. Pseudo-Narcissus*, *N. poeticus*, and the very numerous hybrids between them which are known under the name of *N. incomparabilis*. Good, deep, loamy soils suit all those varieties, and they also do well on deep, sandy or gravelly soils. The main point is to dig the

ground well at or before planting-time, and on no account to use any crude stable, farmyard, or other manures. If the land is impoverished, and manure essential, then deep culture and heavy manuring should be followed by a crop of early Peas, Potatoes, or other similar produce, after which the land can be again well worked, and the *Narcissus* bulbs planted. This method is that followed by most of those who grow *Narcissus* bulbs and cut-flowers for market, near London, in Lincolnshire, and elsewhere. Top-dressings may be applied to plots or beds of *Narcissus* with advantage in the spring as soon as the leaves appear. A good dressing is that composed of bone-dust and wood-ashes, mixed with five times their bulk of fine or sifted soil. Basic slag has been used with good effect, as also sulphate of potash mixed with five times its bulk of fine sifted earth.

June, July, and early in August are the best months for digging and replanting, and it is always best to dig the bulbs when the leaves turn yellow; dig too early rather than too late, and in all cases before the young roots appear from the base of the bulbs. Bulbs may be dried in a cool and airy shed, and should not be exposed to the sun in the open for any length of time.

Trade growers lift their stock every year, selecting the large-flowering from the stock bulbs, and then replant them in separate plots; but in private gardens annual digging and replanting is not always necessary, except for bedding or flower-garden displays. On ordinary borders the strong-growing kinds may be allowed to remain from two to five years undisturbed with advantage, after which time the bulbs become too crowded, the soil exhausted, and the blooms perhaps sparse and small. Delicate varieties are best treated by being dug and replanted in fresh soil every year, and in any case it is best to dig and replant in June or July any kinds that show signs of weakness, ill health, or that do not bloom satisfactorily. Now and then *N. poeticus* varieties, single and double, "go blind", i.e. produce scapes but not flowers, and the remedy is to replant the worst half of the stock every year.

Bulbs may be planted from 3 to 7 inches deep; the drier and lighter and warmer the soil, the deeper the bulbs may be covered. Large-growing kinds may be placed 6 inches apart, and smaller or weaker bulbs nearer, say 3 inches or less.

Narcissi are readily increased by side bulbs or offsets, which are taken off at planting time; but if new varieties are desired, then careful cross-pollination is necessary, and the resulting seed must be saved and sown.

Small quantities of seed may be sown as soon as ripe in well-drained boxes of sandy soil, and these can be sheltered in a half-shady cold frame or pit. Sown in July or August, the seedlings appear the following spring, and must be transplanted when dormant, and grown on for from three to five or six years before they bloom. Seed of the strong-growing kinds may be sown on a layer of good soil spread in a cold frame, or even in open-air seed-beds in mild localities. Seed of small and choice-growing species and their hybrids may be sown in boxes or pots, in a greenhouse, or slightly-heated pit or frame.

Pot Culture (fig. 579).—All the Daffodils, Poets, and Incomparabilis varieties, are very effective in pots for early-spring flowering.

So also the forms of *N. Tazetta*, beginning with "Paper White" and "Double Roman", which may flower at Christmas in the greenhouse, being succeeded by "Grande Monarque", Soleil d'Or, "Scilly White", and many other kinds.

Pot up the bulbs in July or August, three to five in a pot, and plunge the pots in a half-shady yard or border until they are filled with roots. If for very early bloom, they must be sheltered



Fig. 579.—*Polyanthus Narcissus* in pot.

in pit or frame slightly heated in frosty weather, removing them to greenhouse or conservatory through the forcing-house or pit as they may be required, always remembering that, like Hyacinths and Tulips, the less fire-heat they receive the stronger they will bloom. Any good fresh loamy soil suits the strong growers, using more sand for the delicate kinds.

When large quantities are forced for cut-bloom, the bulbs may be packed nearly close together in shallow boxes, and forced on as required. Apart from the strong, decorative varieties, there are some choice species and varieties that are never seen to better advantage than when grown in pots and sheltered in the greenhouse or conservatory. Of such are the forms of the "Hooped Petticoat" Daffodils (*N. Bulbocodium*), White, Sulphur, and Golden-yellow. *N. Jonquilla*, or true Jonquil, one of the most distinct and the sweetest of all, is never

seen so beautiful as when so grown. *N. triandrus*, and its choice ivory-white hybrids, are exquisite under pot culture, as also are the dwarf kinds, such as *N. juncifolius*, *N. rupicola*, *N. minimus*, and *N. cyclamineus*.

Gathering the Flowers.—Narcissus flowers should be cut just as the perianth lobes expand at their tips, placing them in water in a light shed or greenhouse, at a temperature of 65° or 70°; the buds rapidly expand, and the result is larger and cleaner flowers than if they had been left to open outside.

If required for sending away, the buds may be packed in shallow boxes after having been an hour or so in water, and thus many more can be sent, and they carry better, than if sent fully open. On arrival, place the stalks in tepid fresh water, and they will open fresh and fair, and show but slight traces of the longest journey.

Nearly all bulbous flowers may be cut early, and treated in the same way.

Water Culture.—All the varieties of *N. Tazetta*, and even the larger Daffodils, may be grown in



Fig. 580.—Daffodil grown in dish of water.

water-glasses like Hyacinths, or in bowls of water and sand or stones (fig. 580). They may also be grown in pots or vases of wood moss, cocoa-nut fibre, or in Jadoo for special purposes.

In China, and in the Chinese quarters in America and California, the water culture of the "Sacred Narcissus", or Joss Lily, has long

been popular, the bulbs being specially grown in China for the purpose. The Joss Lily is simply an eastern variety of *N. Tazetta*, a white form with a yellow crown. The bulbs are large with several offsets attached, and these blossom as well as the main bulb. Placed in bowls of water and stones, and set in the sunny window of a warm room, the leaves and scapes grow 16 inches high, and develop their flowers in about forty-two days, or six weeks. There is no mystery nor magic about it, for nearly any well-ripened bulb may be grown and flowered in water-glasses, or in bowls of water and stones.

Narcissus for the Wild Garden (fig. 578).—Of late years very fine effects have been made at Kew, and in the London Parks; at Warley Place, and at Gravetye Manor, as throughout the whole country, by the bold and artistic grouping of these bulbs on the grass. All the strongest, and even some of those reputed delicate and uncertain in cultivated beds or on borders, thrive and bloom vigorously on meadow or lawn in the grass.

The best kinds are the Daffodils, *N. poeticus* and *N. incomparabilis*, and in most good gardens the natural increase of stock will supply the necessary bulbs for this beautiful phase of spring gardening, which affords at once a natural and beautiful use for the overflow from the garden proper.

The main point in planting out bulbs of Narcissus, or other kinds, on grass, is to do it as naturally as possible. If one looks at the wild Lent-Lily in a Kentish orchard or meadow, it groups itself without a trace of formality. There may be dots on the fringe of denser groups, but there are no lines, half-moons, nor circles. In planting, lead the large groups into each other, and see that each group or colony has a focus spot, *i.e.* one group or mass of bulbs of greater importance than the rest. An irregular cloud-like effect is the one to aim at, strong at one point, and shading gradually away from that to the margin. A large expanse of ground covered with bulbs in an equable manner never pleases an artistic eye, and in nature we never see bulbs or other plants in forest or field equally distributed.

WILD SPECIES.

GROUP I.—MAGNICOBONATI.

Large-cupped or Trumpet Daffodils. Crown as long, or longer, than the perianth divisions.

(a) Flat-leaved.

N. cyclamineus.—A small species from Oporto, with bright-green flat leaves and golden flowers, the perianth lobes turned back as in Cyclamen. Portugal.

N. Pseudo-Narcissus (Common Daffodil or Lent Lily).—Of this there are many forms, ranging from *N. minimus*, 3 or 4 inches high, to *N. maximus*, which varies from 2 to 3 feet, all having flat glaucous or gray-green leaves. Britain and throughout North and North-western Europe.

(b) *Rush-leaved*.

N. Bulbocodium (Hooped Petticoat) (fig. 581).—Leaves thick and bright-green. Flowers white, sulphur or deep yellow. Perianth lobes narrow and pointed; corona large

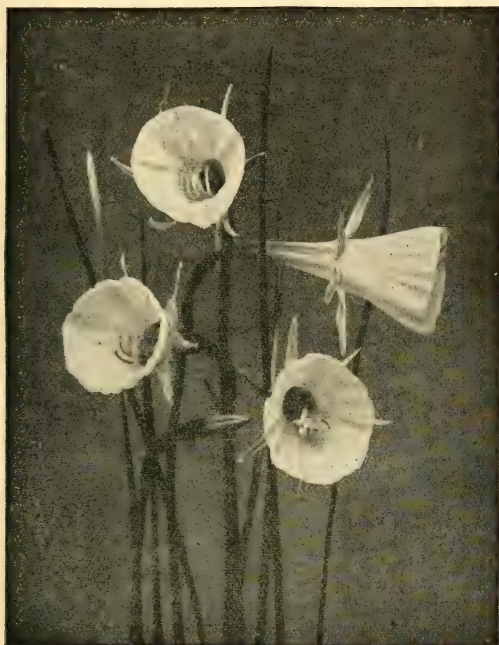


Fig. 581.—Hooped Petticoat Daffodils.

and funnel-shaped. There are five or six distinct varieties, *N. Bulbocodium*, var. *conspicuous*, being one of the best and most showy. Spain, South-west France, North Africa.

GROUP II.—MEDIOCORONATI.

Crown half, or rarely three-quarters, as long as the perianth divisions.

(a) *Flat-leaved*.

N. dubius.—Scapes two- to nine-flowered. Flowers similar to those of *N. juncifolius*, but all white. Leaves flat, slender, glaucous. Not a showy kind. South France—Toulon, Avignon, Nice, &c.

N. incomparabilis.—Flowers solitary on tall scapes, 2–4½ inches across, white, yellow, or bicoloured, the expanded cups often rich-red or orange. One of the most variable of hybrids, found wild, and much raised in gardens. *N. Barrii*, *N. Leedsii*, *N. Burbidgei*, and the wild *N. Bernardii* are examples. Spain, South-west France, Tyrol.

N. Macleayi.—An old garden hybrid between the Daffodil and *N. Tazetta*, a foot high. Leaves greenish. Perianth white, cup straight and yellow. One to two flowers on each scape. *N. Sabini* is another old hybrid in this group with larger flowers. *N. Backhousei*, and *N. Nelsoni* belong to this group.

N. montanus.—A probable wild hybrid of the Pyrenees between *N. poeticus* and *N. moschatus*. Flowers all white, smaller, and more nodding than in *N. incomparabilis*. One

of the parents of the pure-white form called *N. Leedsii*, and its varieties. ?Pyrenees.

(b) *Rush-leaved*.

N. juncifolius (Jonquil).—Leaves bright-green and rush-like. Scapes one- to five-flowered, with a flattened corona. Very sweet-scented. Spain and South-west France.

N. odoratus (Campernelle Jonquil).—A hybrid wild in South France and Spain, and also raised in gardens between the Daffodil and the Jonquil. Flowers all golden-yellow, two to five on a scape; having bright-green rush-like leaves. There are four or five single and one double variety. Spain, South-west France, Italy.

N. triandrus (Angels' Tears) (fig. 582).—Leaves broad, pale-green, and rush-like. Scapes one- to nine-flowered. Perianth divisions abruptly reflexed. Hybridized with the Daffodil, it gives a race of exquisite pale, drooping flowers. Has also formed hybrids with *N. Bulbocodium monophyllum*, such as *N. Trimon*, and others. Spain and Portugal. *N. calathinus* is the largest and finest form of *N. triandrus*, found wild in L'Iles de Glenan, off the coast of Brittany.

GROUP III.—PARVICORONATI.

Crown less than half as long as the perianth divisions.

(a) *Flat-leaved*.

N. biflorus.—Wild near Montpellier, where *N. Tazetta* and *N. poeticus* grow together, and known to be a hybrid though long considered a species. Naturalized in England and Ireland. Grows anywhere in meadows, but is not a good garden plant. France, Switzerland, Italy.

N. Broussonetii.—Flowers many on a scape, white, funnel-shaped, with the crown nearly suppressed, and the habit of *N. Tazetta*. Not a good garden plant. Mogadore, North Africa.

N. canariensis.—A slender-habited form of *N. Tazetta* from the Canary Islands.

N. pachybolus.—Habit and appearance of *N. Tazetta*, of which it seems to be an African form. Algeria.

N. poeticus (Pheasant's Eye).—A very variable and widely-distributed European species. Flowers solitary, pure white, the shallow crown having a red or purple ring around its margin. Sweet-scented; one of the hardiest, most useful, and distinct of all garden Narcissi. Mr. Engleheart's new seedlings are very handsome. South Europe, France to Greece.

N. Tazetta.—One of the most variable and widely-distributed species of the genus, extending from Europe and North Africa in the Mediterranean to North India, China, and Japan. Bulbs often very large. Leaves glaucous. Scapes two- to fifteen-flowered. Flowers white, sulphur, deep-yellow, or bicoloured, and sweet-scented. Much grown and improved by seed in Holland a century or more ago. Has been hybridized with the Daffodil (= *N. tridymus*, *N. Sabini*, &c.), with *N. poeticus* (= *N. Musarts orientalis* and *N. Bazelman major*). South Europe, Cashmere, North India, China, and Japan. This species is undoubtedly the true poet's Narcissus of Greece and Italy, &c.

(b) *Rush-leaved*.

N. gracilis.—This and *N. tenuior* are hybrids between *N. juncifolius* and the Daffodil, and bear soft yellow flowers similar in shape to those of *N. poeticus*—very late-flowering kinds. Not wild.

N. intermedius.—Long thought a species, but now known as a hybrid between *N. Jonquilla* and *N. Tazetta*.

Not very showy or distinct, simply a rush-leaved *N. Tazetta*. Spain, South France, Balearic Islands, &c.

N. Jonquilla.—Flowers slender and star-like, golden-yellow, two to seven on a scape, sweet-scented; with bright-green rush-like leaves. *N. jonquilloides* is a large form, probably a seedling between *N. Jonquilla* and a yellow-flowered *N. Tazetta*. Spain, South France, Italy, to Dalmatia.

(c) *Autumn-flowering Species.*

N. elegans.—Plant small. Scape one- to three-flowered at same time as the leaves. Flowers pure-white. Not showy nor easily grown. Italy, Sicily, Algiers.

N. serotinus.—Similar to the last, but with larger flowers and broader segments. Blooms after the leaves have withered. Like the last not a good garden plant. Spain, South Europe, Barbary States, Greece, and Palestine.

N. viridiflorus.—Habit slender, with rush-like leaves and scapes. Flowers very slender and star-like, pale-green, two to seven on each stalk. Not a garden plant. Spain and Barbary.

Best Garden Varieties (see figs. 583, 584).—The newest and best of seedling Narcissi can only



Fig. 582.—*Narcissus triandrus albus* ("Angels' Tears").

be obtained at very high prices, and many of those exhibited and certificated cannot yet be purchased at any price. Such as Madame de Graaff, Monarch, Weardale Perfection, Hodsock Pride, King Arthur, and Pope's King may be had at prices varying from 15s. to £10 per bulb; but, up to the present, no money could secure bulbs of "Ellen Willmott" or "Mrs. Berkeley", two of the finest of all English seedlings. "Maggie May" costs at present 18 guineas. Fortunately, however, they increase rapidly, so that in a few years' time these choice sorts will be plentiful, and consequently less costly. A large proportion of the older kinds are very abundant and cheap by the hundred or thousand.

The true Daffodils are those with golden bi-coloured and sulphur or white flowers. As a rule, the golden and bicolor varieties grow well in almost any soil, but the pale sulphur-and-white kinds often fail on open sunny borders, doing better in half-shade or in the grass.

The following list of varieties has been compiled chiefly from the catalogue of Messrs. Barr & Sons, with their sanction:—

MAGNICORONATI (LARGE TRUMPETS).

Golden Daffodils.

Abcissus (nuticus). Straight trumpet, starry perianth; late. Pyrenees.

Alvarez. A small Emperor, 6 inches high.

Ard Righ (Yellow King). A yellow form of *spurius*.

Captain Nelson. Clear-yellow, shapely, and dwarf.

Coronatus. Light-yellow, broadly-expanded trumpet.

Countess of Annesley. Sulphur-yellow, trumpet darker; early.

Cyclamineus major. Large yellow form; grass, pots, or borders.

Emperor. Primrose, yellow trumpet; strong grower.

Fred Moore. Soft-primrose, trumpet golden, frilled.

Glory of Leyden. Deep-yellow perianth, trumpet darker; one of the largest.

Golden Queen. Clear-yellow; strong grower in half shade.

Golden Spur. Fine bold yellow flower; early, one of the best.

Henry Irving. Early and free, good for pots or borders.

Hillside Daffodil. Rich golden-yellow, large trumpet; early.

John Nelson. Nearly self-yellow, drooping flower.

Johnstoni King of Spain. Similar to next; shorter, reflexed trumpet.

Johnstoni Queen of Spain. Canary-yellow, trumpet straight; hybrid between the Daffodil and *N. triandrus*.

Lady Helen Vincent. Soft clear-yellow.

Lady Willes. Primrose-yellow; strong and dwarf.

Major. Deep-gold, smaller than Golden Spur.

Maximus. One of the best golden kinds, prefers a deep loam.

Minimus. The smallest trumpet Daffodil; pretty in rockery.

Minor. Dwarf, deeper in colour than *maximus*.

M. J. Berkeley. Larger and paler than *maximus*.

Nanus. Dwarf, pale-yellow, good for rockery; early.

Obvallaris (Tenby Daffodil). Rich-yellow, fine form; early.

P. R. Barr. A small Emperor.

Ray Smith. Rich-yellow trumpet, perianth gracefully twisted to a point; strong, with broad glaucous foliage.

Rugilobus. Probably the parent of Emperor.

Santa Maria. Rich-yellow, shapely.

Saragossa. Like *obvallaris*, but paler in colour.

Shakespeare. Sulphur perianth, deep-golden cup.

Spurius. Golden-yellow; forces well.

Tenby Daffodil. See *Obvallaris*.

Thomas Moore. More free-blooming than *major*.

Willie Barr. Clear-yellow perianth; trumpet deep-gold.

White and Sulphur Daffodils.—These prefer a north or north-west aspect; they rarely do well in sunny borders. Pure, fresh, sandy loam is the best soil, and lifting every year is an advantage.

Albicans. White and sulphur, curled brim.

Apricot. White perianth, apricot trumpet.

Bicolor. Sturdy and free, latest of all.

Cecelia de Graaff. White, trumpet fluted, brim wavy.

Cernuus. The white Daffodil, early, likes shade; good for pots. The double form is rare.

Colleen Bawn. Flowers nodding, white, twisted perianth.

Corrie Plomp. White and primrose; free, strong grower.

C. W. Cowan. White and sulphur, small; good grower.

Dean Herbert. Sulphur perianth, trumpet yellow.

Duke of Bedford. Perianth white, $4\frac{1}{2}$ inches wide; trumpet 2 inches wide, yellow.

Empress. White and yellow; succeeds *Horsfieldii*.

Exquisite. Sulphur, shading off white.

F. W. Burbidge. White and sulphur; grows well.

Galatea. Large, perianth white; free and early.

Grace Darling. Twisted perianth, trumpet primrose; free.

Horsfieldii. White and yellow, larger than last; early.

J. B. M. Camm. Fine form, distinct colour; a good grower.

John Davidson. Perianth white, trumpet clear-yellow; strong.

John Parkinson. Large white perianth, short yellow trumpet.

Lady Somerset. Tall, white, straight trumpet, perianth twisted.



Fig. 583.—Group of Daffodils.

1, Sir Watkin. 2, John Bain. 3, Mrs. Langtry. 4, Queen of Spain.
5, Glory of Leyden. 6, Gem. 7, Moschatus.



Fig. 584.—Group of Daffodils.

1, Barrii conspicuus. 2, P. R. Barr. 3, Beatrice. 4, Mde. de Graaff.
5, J. B. M. Camm. 6, Triandrus albus. 7, Corbularia Citrina.

Madame de Graaff. Cream-white; one of the largest and best.

Madame Plomp. Large flower, good substance; strong grower.

Matson Vincent. Flowers small, white; dwarf, free.

Michael Foster. Sulphur-white, yellow trumpet, dwarf.

Moschatus. The wild white Daffodil of the Pyrenees, and probable origin of all the garden white Daffodils; excellent for damp, shady rockery, or for pots.

Mrs. Burbidge. Primrose to white; a good grower.

Mrs. Camm. Free, white; a good grower.

Mrs. M. Crosfield. Large, first-rate for cut-bloom, or for naturalizing.

Mrs. Thompson. Grows well and flowers freely.

Mrs. Vincent. Extra fine, grows freely.

Mrs. Walter Ware. Strong grower, free and beautiful.

Pallidus-præcox. Early, variable; best in shade or on grass.

Princeps. Large, first-rate for cut-bloom, or for naturalizing.

Princess Ida. White, trumpet edged with primrose.

Scoticus. Wild Scotch Daffodil; good in grass, &c.

Sentinel. Perianth broad, erect, white, yellow trumpet; strong.

Snowflake. White, trumpet buff to white; robust.

Sulphur King. Pale-sulphur, of good substance, well-formed.

T. A. Dorrien-Smith. Perianth white, rich-yellow trumpet.

Tortuosus (*Leda* and *Sarnian Belle*). Shapely, fragrant.

Tuscan Bonnet. Like *princeps*, with canary-yellow trumpet.

Variiformis (nobilis). Wild in the Pyrenees; probably the parent of all the *bicolor* vars.; does well in grass.

Victoria. An improved *Empress*; strong, fine for pots.

Weardale Perfection. White, pale-primrose trumpet; one of the best.

William Goldring. Perianth white, trumpet primrose; long and drooping.

W. P. Milner. Sulphur, dwarf, free growth; good in pots.

Double Trumpet Daffodils.

Capax plenus, also known as *Eystettensis*, Queen Anne's Double. Perianth segments pale-sulphur, superposed in a star-like manner; rare and beautiful.

Cernuus plenus. Charming old double white; grows well in pure gravelly loam, in half shade, or in grass.

Lobularis plenus. Flowers yellow, fragrant; dwarf.

Minor plenus (*Rip Van Winkle*). Narrow claw-like segments.

Nanus plenus. Rich-yellow; dwarf, early.

Plenissimus (*Parkinson's Rose-flowered Daffodil*). Large, rose-shaped, with several centres, sweet-scented; dwarf in habit.

Princess. Yellow, dwarf, symmetrical in form.

Pseudo-Narcissus plenus. Common Double English, or Gerard's Double Lent Lily; does well in grass.

Scoticus plenus. Similar to last, but larger.

Telamonius plenus. The common double Daffodil of cottage gardens and orchards. The best of the double kinds for colour effect; does well in grass.

MEDIOCORONATI.

Chalice-cupped Daffodils.

Autocrat. Yellow, with wide expanded cup.

Beauty. Sulphur, cup margined orange-scarlet; large, free.

C. J. Backhouse. Yellow, cup elongated, orange-red.

Commander. Sulphur, cup large, suffused orange-red.

Cynosure. Primrose to white, cup orange; very showy.

Edward Hart. Nearly self-yellow.

Frank Miles. Large, soft-yellow, perianth twisted.

George Nicholson. Pure-white, cup yellow.

Gloria Mundi. Yellow, cup rich orange-red.

Goliath. Perianth white, barred yellow, cup yellow.

Gwyther. Broad yellow perianth, cup suffused orange.

Hogarth. Full yellow cup, large, perianth twisted.

James Bateman. Perianth white, clear-yellow cup; late.

King of the Netherlands. Perianth sulphur, cup large, spreading, orange.

Leedsii. Perianth yellow, cup orange-scarlet; early.

Lorenzo. Perianth primrose to white, cup yellow.

Lulworth. White perianth, cup orange-red; apt to split.

Mabel Cowan. Perianth white, cup margined orange.

Magog. Perianth sulphur, large yellow cup.

Mary Anderson. Perianth white, cup orange-scarlet.

Poiteau. Perianth white, cup yellow; stiff habit.

Prince of Wales. Perianth sulphur, cup stained orange-scarlet.

Princess Mary. Perianth imbricated creamy-white, cup orange.

Prince Teck. Perianth creamy-white, cup yellow, large.

Queen Bess. Perianth white, light yellow cup; early.

Queen Sophia. Large, perianth sulphur, cup orange-scarlet, frilled.

Red Coat. Perianth orange-yellow, cup orange-red, crenulated at brim; the first break of orange-red in the perianth.

Red Star. Perianth creamy-white, arched, cup stained red.

Semipartitus. Perianth and cup primrose, cup deeply-lobed, distinct.

Sir Watkin. Perianth sulphur, cup yellow tinged orange; a sturdy grower, a handsome border plant, also excellent for pots.

Splendens. Perianth sulphur, cup large, edged orange-scarlet.

Stella. White perianth, with yellow cup.

Stella superba. Flowers large, white, with showy yellow cup.

Titan. Perianth yellow, cup margined orange, large.

Incomparabilis.—Flowers greatly prized for bouquets and vases. Effective in beds, borders, or naturalized.

"Butter and Eggs". Large yellow, orange towards the centre, effective in clumps.

"Codlins and Cream" (*Sulphur Phoenix*). Large, white, with sulphur centre.

"Eggs and Bacon" (*Orange Phoenix*). Large, rose-shaped, white, orange centre.

Barrii.—Perianth segments much longer than the cup.

Cecily Hill. Perianth primrose, cup yellow flushed cinnabar-red.

Conspicuous. Large yellow perianth, cup edged orange-scarlet.

Crown Prince. Perianth white, cup large, stained scarlet; sturdy grower.

Dorothy E. Wemyss. Large white perianth, cup yellow edged orange-scarlet.

Dr. Fell. Perianth whitish, cup orange-scarlet; valuable for pot-culture; not suitable for the border, the flower-buds being liable to suffer from frost.

Flora Wilson. Perianth white, cup stained orange-scarlet.

General Murray. Perianth white, cup canary shot with orange; free-flowering.

Golden Gem. Perianth rich-yellow, cup edged orange; late, very free.

Golden Mary. Bright golden-yellow, very showy; late.

Maurice Vilmorin. Creamy-white perianth, cup lemon, stained red, dwarf; exquisite for cutting.

Miriam Barton. Perianth and cup soft-primrose.

Mrs. C. Bowly. Pure-white perianth and orange-red cup.

Orphee. Perianth primrose, cup edged orange-scarlet; early.

Sensation. Perianth large white, cup canary edged orange-scarlet.

Sidlington. Yellow, cup margined orange-red; sometimes twin-flowered.

Leedsii.—Like *Incomparabilis*, but cup coloured lemon or white.

Amabilis. White perianth, cup sometimes tinged apricot.

Beatrice. Perianth pure-white, remarkably elegant cup.

Duchess of Brabant. Perianth white, cup canary; free-flowering.

Duchess of Westminster. White perianth, long canary cup, changing to pure-white.

Elegans. Drooping white perianth, cup sometimes stained apricot.

Fanny Mason. Perianth white, cup canary-yellow.

Gem. Perianth and cup white, of elegant form.

Grand Duchess. Perianth white, cup stained apricot; early.

Hon. Mrs. Barton. Pure-white perianth, cup primrose to white.

Katherine Spurrell. Perianth white, cup canary, large.

Leedsii. Silvery-white starry flowers; sweet-scented.

Madge Matthew. Large white perianth and cup; early.

Maggie May (*Edmond's White*). The most beautiful of this section; flowers of great size, with broad white perianth and large pale-citron frilled cup.

Minnie Hume. Large white perianth, cup lemon to white.

M. Magdaline de Graaff. White perianth, cup orange; usually two-flowered, late.

Modesty. Long white tapering perianth and cup, drooping.

Mrs. Langtry. Perianth white, cup large, white, edged yellow; free.

Palmerston. White perianth, canary cup; late, fragrant.

Princess of Wales. Small starry white perianth, frilled white cup; tall.

Superbus. Perianth white, large, and drooping, long white cup.

Una. Perianth creamy-white, large, cup citron tinged apricot.

Backhousei.—Trumpet-shaped crown.

Backhousei. Stout trumpet-shaped yellow cup, paler perianth.

Border Maid. White perianth, yellow, short trumpet.

Joseph Lakin. Sulphur perianth, yellow cup.

William Wilks. Imbricated primrose perianth, orange-yellow frilled trumpet.

Wolley Dod. Large primrose perianth, short yellow trumpet.

Nelsoni.—Cup goblet-shaped, perianth snow-white.

Aurantius (*Nelson's Orange*). Broad white perianth, cup orange-red.

Major. Perianth white, bright-yellow cup.

Minor. Perianth white, cup bright-yellow, distinct; dwarf.

Mrs. Backhouse. Large white perianth, clear-yellow cup.

Mrs. E. G. Knights. Broad white perianth, stiff yellow cup.

Pulchellus. Perianth white, cup yellow, campanulate.

Stanley. Perianth white, straight yellow cup, distinct.

William Backhouse. Broad imbricated white perianth, clear yellow cup.

Bernardi.—Natural hybrids between *N. poeticus* and *N. abscissus*. Pyrenees.

Bernardi. Perianth white, cup variable in size, yellow to orange-scarlet.

H. E. Buxton. Perianth white, cup orange-scarlet; free-flowering.

Tridymus.—Garden hybrids between the Trumpet Daffodil and *Tazetta*, generally bearing more than one flower on a stem.

A. Rawson. Clear yellow perianth, darker yellow cup.

Miss White. Stem bearing three to four white flowers.

S. A. de Graaff. Large imbricated yellow perianth and cup.

The Twins. Two-flowered, perianth creamy-white, yellow cup; violet-scented.

Triandrus (*Ganymedes*).—The white Cyclamen-flowered Daffodil from the mountains of Portugal and Spain, growing in very hard, firm, fine gritty soil, in fissures of rocks; good for pots and rockwork. They all prefer shade, a gritty soil, and well-drained position.

Albus (*Angels' Tears*). White, variable, perianth elegantly reflexed.

Calathinus. Snow-white, larger than *albus*, lovely and rare.

Concolor. Uniform soft yellow, rare.

N. cyclamineus, *N. Johnstoni* *Queen of Spain*, and *N. triandrus* varieties are the only Daffodils with reflexed petals.

Pulchellus. Perianth primrose, cup white, rare.

Odorus (Fragrant Giant Jonquil-Daffodil).—Useful for indoor decoration when grown six in a pot, also charming in beds, borders, and naturalized on grassy slopes, &c.; valuable flowers for cutting.

Heminalis. Rich golden-yellow, cup long, delightfully fragrant.
Odorus (*Campernelle Jonquil*). Rich yellow, several flowers on a stem.

Odorus plenus. Resembles a small double yellow Rose; extra fine, prefers shade.

Rugulosus. Rich yellow wrinkled cup; valuable for bedding.

PARVICORONATI.

Burbidgei (*incomparabilis* × *poeticus*).—Differ from *N. poeticus* in the cup of the flower being a trifle longer; the early forms commence flowering before *poeticus ornatus*, and continue, one variety after another, from March to the middle of May.

Agnes Barr. Perianth creamy-white, cup yellow.

Bayoness Heath. Perianth yellow, cup suffused throughout orange-scarlet.

Beatrice Heseltine. Large creamy-white perianth, cup edged orange-scarlet.

Burbidgei. Perianth clear-white, cup margined red; early.

Constance. Perianth sulphur to white, cup edged orange-scarlet.

Crown Princess. Perianth white, cup canary margined orange.

Ellen Barr. Perianth white, cup citron stained orange-scarlet.

Falstaff. Perianth snow-white, cup lemon margined orange.

John Bain. Large white perianth, cup citron.

Little Dirk. Small primrose perianth, cup edged orange-scarlet.

Mercy Foster. Crinkled white perianth, frilled canary cup.

Model. Perianth clear-white, cup frilled, stained orange.

Princess Louise. Large white perianth, cup wide, orange-scarlet.

St. John's Beauty. Large sulphur perianth, cup frilled, edged orange-scarlet.

The Pet. Perianth white, cup yellow; strong dwarf.

Vanessa. Compact yellow perianth, expanded cup, good shape.

Poeticus (the Poet's Daffodil).—There are early- and late-flowering varieties; excellent for pots, borders, and wild garden. Mr. William Robinson writes: "Four years ago I cleared a little valley of various fences. Through this runs a streamlet, and we grouped the Poet's Narcissi near it, also in a little orchard that lay near, and through a grove of Oaks. This year the whole landscape was a picture such as one might see in an Alpine valley."

Atmira. Broad rounded, white perianth, cup margined red.

Cassandra. Tall and vigorous; broad wide white perianth, cup deeply-rimmed red.

Chaucer. Large, petals broad, with large flat crimson cup.

Double White (*Gardenia-flowered*). Pure-white, double; sweet-scented.

Grandiflorus. White and very large, cup suffused with crimson.

Lady of the Lake. Large, pure-white; very free.

"Marvel". White, cup margined with saffron.

Ornatus. Pure-white, cup margined with scarlet.

Poetarum. Perianth white and broad, cup orange-scarlet.

Poeticus (the *Old Pheasant's Eye*).

Præcox grandiflorus. White, cup suffused-crimson; tall, early.

Tazetta (Polyanthus or Bunch-Flowered Narcissus).—Specially adapted for winter and spring decoration when grown in pots. The culture is the same as that of the Hyacinth. In flower-beds and mixed borders they produce a beautiful effect. Plant in October or November, but at the approach of winter give a light covering of long litter or other material to keep off severe frosts; remove the covering in March.

Adonis. Perianth primrose, cup deep orange-yellow.

Apollo. Perianth deep-primrose, cup orange-yellow.

Bathurst. Perianth yellow, cup deep-golden, dwarf.

Bazelman major. White perianth, large dark-yellow cup.

Charles Dickens. Perianth primrose, cup orange-yellow.

Couronne Blanche. White, cup yellow, fine large flower; late.

Double Roman. Double white, orange nectary; prized for early forcing.

Gloriosus. Perianth white, cup orange-yellow; early.

Grand Monarque. Large white perianth, cup primrose-yellow.

Grand Soleil d'Or. Perianth golden, cup deep-orange; early.

Her Majesty. Broad white perianth, large deep-golden cup.

Jaune Supreme. Perianth buff-primrose, cup orange-yellow.

La Comtesse. Large perianth pale-primrose, cup yellow.

Maestro. Perianth white, large orange cup; very free.

Mont Cenis. Clusters of large white flowers, cup yellow; early.

Orientalis (*Muzart*). Perianth large, white, cup deep orange, very showy; late.

Paper White "*Early Snowflake*". The old Paper White Narcissus.

Queen of the Netherlands. Pure-white perianth, yellow cup; early.

"Scilly Isles" White. Perianth white, cup creamy-white; dwarf, early.

Sir Isaac Newton. Perianth golden-buff, cup orange-yellow, large.

White Perfection. White Perianth, cup almost white; dwarf and late.

[F. W. B.]

Nepenthes.—Pitcher-plants are of exceptional botanical interest owing to their wonderful leaf-structure and arrangements for trapping insects to obtain food from them. They are



Fig. 585.—Pitchers of *Nepenthes*:—
1, *cineta*; 2, *Curtisii*; 3, *Northiana*; 4, *Rafflesiana*.

equally interesting horticulturally, the pitchers of many of the species being large and ornamental (fig. 585). Their flowers, which are without attraction, are rarely developed by plants under cultivation. They have their value, however, in affording opportunity for hybridization, and as the species cross readily with each other, numerous hybrids have been raised, chiefly by Messrs. J. Veitch & Sons.

There are about thirty species, all natives of the old world tropics, principally Malasia.

Whilst they show little variation in flower and leaf, there is considerable range of variation in the pitchers, some being small and thimble-like, whilst others are large enough to hold a quart of water. They vary also in form, and in colour they range from green to brown-red and crimson, many of them being mottled. When healthy, they keep fresh on the plants for about a year.

A moist tropical house is necessary for all

or nearly all the cultivated sorts, the exception being *N. Rajah*, which thrives at Glasnevin in a cool house. They require shade from bright sunshine and plenty of water at the root at all times, daily watering being not too much for them. They prefer a mixture of peat-fibre and sphagnum, such as is used for epiphytic Orchids, and this should be renewed every spring. The roots, which are thin, brittle, and black, require careful handling; washing the soil away from



Fig 586.—*Nepenthes Tiveyi*.

them being preferable to shaking them. They are better in teak-baskets than pots. When growing vigorously a weekly watering with cow-manure water is helpful. If large pitchers are desired, the tops of the shoots should be taken off above from four to six good leaves on which pitchers are showing. Leggy plants should be cut down to the base in January, and when new growth shows they should be carefully transferred into fresh soil, first removing the old as already advised. When the pitchers open they contain a quantity of liquid which should not be turned out to gratify curiosity. Should the liquid evaporate, water must be substituted or the pitcher will shrivel. Cuttings of healthy shoots root if planted in sandy sphagnum and placed in a close propagating-frame.

Their seeds germinate freely in about six weeks if sown on a pan of chopped peat-fibre and covered with a pane of glass. Pitchers are developed on the tiny seed-leaves. With good treatment, plants twelve months old should

have leaves four inches and pitchers an inch long. If allowed to grow unstopped some of the species develop stems 20 to 30 feet long. The pitchers produced on long stems are smaller, narrower at the base, usually wingless, and less highly coloured than those on short stems.

Thrips soon injure *Nepenthes* if once they obtain a footing on the leaves. Frequent fumigation with tobacco or "XL-All" will destroy them. *Nepenthes* are really easily managed if afforded abundance of moisture and an open fibrous sweet condition at the root.

The best of the species in cultivation are:—

N. ampullaria. Free grower, short green pitchers, small lid.

N. Burkei. Long, wingless, narrow pitchers, green, with large red-brown blotches.

N. Burkei, var. *excellens*. Pitchers larger and richer in colour, very handsome.

N. cineta (fig. 585). Stem stout, pitchers 8 inches long, green, flushed red, blotched purple.

N. Curtisii (fig. 585). Pitchers 8 inches long, green, red-brown blotches, elegant lid, broad rim.

N. Curtisii, var. *superba*. Pitchers larger and richer in colour, rim crimson.

N. Northiana (fig. 585). Pitchers a foot long, greenish-red striped and spotted crimson.

N. Phyllamphora. Free grower, thin wavy leaves, pitchers green.

N. Rafflesiana (fig. 585). Strong grower, large inflated broad-winged green mottled-red pitchers.

N. Rafflesiana, var. *Hookeriana*. Pitchers shorter and with narrow wings.

N. sanguinea. Leaves fleshy, rich green, pitchers large, uniform red.

N. Veitchii. Leaves hairy, dwarf habit, pitchers green with wide rim.

The following are the best hybrids:—

N. Balfouriana (*mixta* × *Mastersiana*). Enormous pitchers, highly coloured.

N. cylindrica (*Veitchii* × *hirsuta*). Long green pitchers, very free.

N. Dicksoniana (*Rafflesiana* × *Veitchii*). Pitchers very large and richly coloured.

N. Mastersiana (*sanguinea* × *distillatorica*). The finest hybrid, very free.

N. mixta (*Curtisii* × *Northiana*). Pitchers large, highly coloured, free.

N. Morganiae (*Hookeriana* × *Phyllamphora*). Elegant habit, bright-red pitchers.

N. Sedeni (*distillatorica* × unknown). Free, pretty little crimson pitchers.

N. Tiveyi (fig. 586) (*Veitchii* × *Curtisii superba*). Very large richly-coloured pitchers.

N. "W. T. Thiselton-Dyer" (*Dicksoniana* × *mixta*). Enormous pitchers, rich in colour.

Nerine (fig. 587).—A genus of useful autumn- and winter-flowering bulbous plants, natives of South Africa. Until recently only two species, *N. sarniensis*, the Guernsey Lily, and *N. curvifolia*, were recognized in horticulture; now, however, eight of the ten known species are grown as decorative plants, and there are also numerous hybrids and seedlings of first-rate merit. The principal growers and breeders of Nerines are Mr. Mansell, of Guernsey; Mr. Elwes, of Colesbourne; Herr Max Leichtlin, of Baden-Baden; and Mr. F. W. Moore, Glasnevin. Mr. James O'Brien bred some good sorts whilst with Messrs. Henderson. *N. sarniensis* was cultivated in Paris in 1634, and in London in 1654, whilst in the Channel Islands it has been regularly cultivated for 200 years for the English and other markets, where it is known as the Guernsey Lily. It is supposed that originally a quantity of bulbs were washed on to the islands from a wrecked ship, and established themselves there.

Cultivation.—The requirements of Nerines are easily afforded, the point of chief importance being the resting of the bulbs. The flower-spikes are developed in the last quarter of the

year, and usually precede the foliage. Growth continues all winter and finishes in April, when the leaves turn yellow and fall off. A pot-bound condition is favourable to the production of flowers. The bulbs may be allowed to crowd (they produce offset-bulbs freely), and a 9-inch pot may hold as many as twenty bulbs all



Fig. 587.—*Nerine curvifolia*.

huddled together. Under good treatment the majority of these will flower annually.

In repotting, the whole mass of soil, roots, and bulbs should simply be transferred intact to a larger pot. The best time to repot is immediately after the flowers have faded. Some growers prefer to repot in July, whilst the bulbs are at rest. A light loam, or a mixture of loam and peat with a little sand, may be used. As a rule, a top-dressing will be found sufficient. A little water may be given after potting or top-dressing, but the bulbs should be kept quite dry until the flower-spikes show. They should be placed in a sunny, cool greenhouse to flower. Whilst making new growth, that is, from the end of the flower-season until April, the plants should be kept in a sunny house or frame, close to the glass, in a temperature not lower than 50° at

night. Air should be given on all favourable opportunities.

After the leaves have faded, the plants should be placed in a sunny, dry position, a frame with a south aspect being best, and exposed to full sunlight whilst being kept absolutely dry. Upon this process of ripening and resting the succeeding crop of blooms depends. Seeds are ripened by cultivated plants, and these ought to produce flowering bulbs in about three years. All the species hybridize freely with each other.

The following are the best of the species and hybrids:—

N. amabilis, scape 12 inches, with large umbel of bright-pink flowers.

N. atrosanguinea, scape 16 inches, flowers 2 inches wide, wavy segments, colour deep salmon-rose.

N. Cami, scape 12 inches, with ten-flowered umbels, colour rosy-scarlet.

N. curvifolia (*Fothergilli*).—The largest and best of the species, and the parent of the best garden hybrids. Scape 18 inches, bearing a twelve-flowered umbel, 6 inches through, each flower $1\frac{1}{2}$ inch wide with broad reflexed segments and long filaments; colour bright glistening scarlet. Specimens in 10-inch pots have borne sixteen heads of flowers. They last about a month. *N. Meadowbankii* is a form of this.

N. elegans-cœrulea, a sturdy hybrid with large umbels of crimson flowers tinged with blue. *Elegans-alba* has pure-white flowers.

N. flexuosa.—Leaves and flowers together. Scape tall, flexuose, umbel ten- to twenty-flowered, the flowers declinate, wavy, pink, with a darker keel. Stamens and style curved. There are several named varieties.

N. Manselli.—The largest and one of the best. Leaves wider than others, produced along with the scape, which is 2 feet high, stout; umbel 6 inches through, composed of twelve to eighteen flowers, each $1\frac{1}{2}$ inch long, with broad, recurved segments, and coloured sparkling-rose. Developed in November, lasting till January.

N. Moorei.—Like *N. curvifolia*, but with green not glaucous leaves, a compressed scape 9 inches long, and a nine-flowered umbel of large bright-scarlet flowers.

N. pudica.—Remarkable in the genus in having ivory-white flowers in loose umbels on scapes 12 inches long; they are bell-shaped and 1 inch long.

N. sarniensis (Guernsey Lily).—Scape 1 foot, umbel of ten to twenty bright rose-red flowers, each $1\frac{1}{4}$ inch, with red filaments; leaves narrow, bright-green.

Var. *corusca*. Foliage broad, umbels of large bright-scarlet flowers.

Var. *Plantii*. Scapes longer than type, and flowers of a deeper shade than the type, being cherry-red.

Var. *profusa*. Flowers bright-scarlet, narrow segments.

Var. *rosea*. Flowers large, deep-rose.

A number of late-flowering seedlings after the *N. curvifolia* type have been raised by Mr. Elwes. They are named in compliment to Lady Lawrence, Lady Bromley, Lady Carrington, &c.

Pæony.—There are in cultivation two distinct sections of this showy genus, namely, the Tree Pæony (*P. Moutan*) (fig. 589), a Chinese

plant—and the many varieties which have been produced from it by cultivators in Europe, Japan, and China—and the herbaceous Pæonies (fig. 588), descendants chiefly of *P. officinalis*, and



Fig. 588.—Herbaceous Pæonies.

P. albiflora, of which there is now a numerous progeny.

The Tree Pæonies form substantial, robust, open-branched, early spring-flowering plants, sometimes attaining 5 or 6 feet in height, with grayish, rugged stems, and very prominent scattered leaf-buds, rapidly followed by the large, round flower-buds, which under the genial influences of spring expand into blossoms of great size, brilliancy, and beauty. They bloom early out of doors, and consequently are liable to injury from frost or cold wind if not protected with hurdles or mats. They are seen at their best when grown in pots and started in a greenhouse in early spring. The Japanese have raised many beautiful varieties. The following list includes varieties of every shade of colour except blue and yellow:—

Beatrice Kelway, Beauty, Don Quixote, Duchess of Teck, Eastern Prince, Elizabeth Herkomer, Henry Irving, Hera, Jean de Reszke, Julius Cæsar, Kelway's Florizel, Lauts, Lord Iveagh, Lord Leighton, Louise Monchalet, Lumen, Mr. Bancroft, Mrs. M'Millan, Mrs. W. Kelway, Princess of Wales, Sir E. S. Hill, Venosa.

The Herbaceous Pæonies have received special attention at the hands of hybridists for the last sixty years or so, and many varieties have been raised by English, French, and Belgian growers, so that they now furnish numerous striking hues of colour, having flowers of crimson, rose-purple, pink, blush, and white; they are most accommodating in their nature, for they will thrive in spots so shaded that scarcely any other plant will thrive there, and in such

places they grow freely, the colour of the blossoms becoming more intense, and the plants remaining a longer time in flower. They display their beauty either in the fronts of large shrubberies and plantations or on the sides of a carriage-approach to a mansion, and when distant effect is required, no plant so

admirably answers that end, as their size and the brilliancy of their colours render them visible at a greater distance than any other flowers. They are also most imposing in large beds. Narcissus may be planted with good effect amongst them to give early flowers in spring, and Gladiolus also do well amongst



Fig. 589.—Tree Peony.

them to give bloom in the late summer months; as centre plants in small beds they make grand objects also. They are invaluable for cut-bloom, and if gathered in a young state, when only a few petals show, they keep for a week in water. The plants are perfectly hardy, and it is difficult to kill them; they withstand any amount of cold or heat, and no vermin, insect, slug, blight, or mildew attacks them; they grow in any soil, but they well repay for deep trenching of the land and manuring highly, and watering in dry weather. Mr. William Kelway, about twenty-five years since, got together all the known species, and hybridized them with great success, raising scores of new kinds, both double- and single-flowered, some of them being scented with Violet or Rose-like perfumes. The leaves are useful in autumn for decoration. The young shoots in spring are coloured rich reddish-brown, changing as they mature to bright green, again assuming rose-red or purple-brown tints in autumn.

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The best double varieties of the herbaceous section are:—

Admiral Dewey, Cyclops, Dr. Bonavia, Duchess of Somerset, Duke of Devonshire, Ella Christine Kelway, Emperor of Russia, Galtee More, Geraldine, Glory of Somerset, Lady Bramwell, Lady Carrington, Langport Queen, Limosel, Lord Beresford, Maria Kelway, Mrs. Chamberlain, Mrs. Gwyn Lewis, Peter the Great, Prince Henry of Battenberg, Prince of Wales, Waterloo.

The best single varieties are:—

Alton Locke, Calliphon, Cherry Ripe, Countess of Warwick, Diadem, Dorothy, Duchess of Sutherland, Emily, Hesperus, Lady Wimborne, Meteor, Millais, Mrs. J. Gundry, Queen of May, Sirdar, Stanley, The Czar, Tinted Venus, Viscount Cross.

[W. H. K.]

Pelargoniums.—The origin of the garden races of Pelargoniums (including what are popularly known as Geraniums) appears to be largely due to accident rather than design. The four sections, viz. Show, Fancy, Zonal, and Ivy-leaved, each containing large numbers of varieties, are the result of cultivation and

selection extending over a period of at least a century, and new varieties are added yearly by Messrs. Cannell of Swanley, Lemoine of Nancy, Bruant of Poitiers, and others. About 700 varieties were awarded certificates by the Royal Horticultural Society in the period between 1860 and 1890.

Much information concerning the early sorts can be obtained from Andrews' *Monograph of the Genus Geranium* (1805), which contains beautifully-drawn coloured figures of the principal species and varieties then in cultivation. The accidental crossing of one sort with another evidently occurred in Andrews' time, who says: "The introduction of the African species within the last twenty years from the Cape of Good Hope, whose prolific character seems to know no bounds in the production of endless seminal varieties, which, Proteus-like, appear in ever-varying forms, and for which numerous variations we are indebted to the industrious bee, which conveys the pollen from one plant to another". Sweet's *Geraniaceæ*, a work of five vols., published 1820-30, containing 500 coloured portraits of Pelargoniums, nearly all of garden origin, gives much information as to their early history in the garden. About 170 species are known. They are nearly all natives of South Africa. Except in botanical collections they are not recognized garden plants.

The four races or sections of Pelargonium are quite distinct from each other, and except in one instance they have refused to interbreed, the exception being the Zonal and Ivy-leaved sections, an accidental cross between the two having been secured by M. Lemoine about twenty-five years ago.

ZONAL PELARGONIUMS.

This section includes the bedding or scarlet Geranium, Bicolor, Tricolor, and Gold Geraniums, and the highly-developed Zonal proper, usually grown for the greenhouse and conservatory in winter. They are all supposed to be descendants from *P. zonale* and *P. inquinans*.

Cultivation.—Cuttings of these may be struck at any season of the year. If, however, good pot-grown plants are desired, cuttings put in in February are to be preferred, as they start into growth immediately, and form dwarf stocky plants by May, when it will be safe to keep them in a frame to be grown on for flowering from October on through the winter. When their flowers are about over, the plants should be rested in a cool house for a few weeks, keep-

ing them dry. This drying process tends greatly to sweeten the soil. The following February or March these plants should be cut back, this process providing the needful stock of cuttings for the spring strike. When they have broken into fresh growth, they should be



Fig. 590.—Zonal Pelargoniums

reotted, reducing the balls sufficiently for them to go back into the same size of pot. Later in the season, as summer advances, these older plants will require another shift. When well established, they will prove useful to follow the Show and Fancy sections in the conservatory. Full exposure to light and air is a *sine qua non* in Pelargonium culture; without this the stocky habit so much desired cannot be had.

The stock for late or winter flowering should be stopped up to the end of August, whilst at no time previous to this should any flowers be allowed to develop. When coming into flower, they need a slight warmth, say 45° to 50° as the minimum, with a free circulation of air to keep down any symptoms of damp. These winter-flowering plants require careful watering, not nearly so much being needed as for the plants that flower earlier in the year. Weak doses of artificial manure, alternately with farmyard liquid given weekly, will assist the plants.

As a variation, a stock of these Zonals will, if grown as standards, serve a distinctly good purpose for grouping with other plants of dwarfer growth. It will probably take two seasons to obtain a stem of say 3 feet in height with a little head as a start. These in another season or two will have formed good heads. The balls of standards ought to be slightly re-



Fig. 591.—A good example of a pot-grown Zonal Pelargonium in November.

duced every spring, otherwise they will get into too large pots.

The soil for Zonals should be of turfy loam and leaf-mould. If, however, the latter fails, use a little peat instead, with silver sand in any case as an addition.

Double Zonals for Pots.

Emile de Girardin. Rosy-pink.

F. V. Raspail. Crimson-scarlet, good habit.

F. V. Raspail—Improved, flowers and trusses larger than type.

Gloire de France. Salmon and white.

King of Denmark. Rosy-salmon.

Le Cygne. White, good truss, large full flower.

Madame Lemoine. Clear-pink.

Turtle's Surprise. Crimson.

White Abbey. White, dwarf, spreading habit.

Single Zonals for Pots.

Amy Amphlett. White.

Charles Maison. Scarlet, fine, very large trusses.

Duchess of Portland. Rosy-pink.

Gertrude Pearson. Pink.

H. Cannell, Junr. Crimson, white eye, flowers large and full.

H. H. Crichton. Crimson, white eye.

Ian Maclaren. Salmon.

International. White.

Inverness. Salmon.

John Milton. Scarlet, white eye, large and full, free.

Kate Farmer. Salmon.

Katherine Moreton. Salmon.

Lady Chesterfield. Deep-salmon.

Lady Churchill. Salmon, fine form.

Lady Reed. White, and salmon centre.

Lord Tredegar. Dark-crimson.

Madame Jules Chretien. Scarlet, light centre.

Mademoiselle Trine. Soft rose-magenta, large trusses.

Mr. H. J. Jones. Purple.

Mrs. D. Saunders. Pink, shaded.

Mrs. E. Rawson. Orange-scarlet, very free; large trusses.

Mrs. Gordon. Dark-crimson.

Mrs. Gordon Lindsay. Salmon.

Mrs. Pole Routh. Shaded salmon.

Mrs. Robertson. Pink.

Norah. Soft blush, extra fine.

Opal. Shaded salmon.

Phaenna. Crimson, shaded.

Queen of the Belgians. White.

Royal Purple. Purple, good habit, splendid trusses.

Rudyard Kipling. Purple.

Sir H. Irving. Rose-magenta, large, free; dwarf habit.

Snowdrop. White.

T. Hayes. Bright-crimson.

Titania. Crimson, with white eye.

W. Bealby. Rosy-scarlet.

Golden Tricolor.—Achievement, E. R. Benyon, Lady Cullum, Louisa Smith, Masterpiece, Mr. H. Cox, Mrs. Pollock, Mrs. Turner, Prince of Wales, Queen Victoria, Sophia Dumaresque, Victoria Regina.

Silver Tricolor.—Charming Bride, Dolly Varden, Imperatrice Eugenie, Lass of Gowrie,

Mrs. John Clutton, Mrs. Laing, Mrs. T. A. Dickson, Prince Silverwings, Princess Beatrice, Proteus.

Gold and Bronze.—Black Douglas, Bronze Queen, Emperor of Brazil, Golden Harry Hieover, Her Majesty, Imperatrice Eugenie, Lulu, Mrs. Harrison Weir, Mrs. Lewis Lloyd, Prince Arthur, The Dragon, The Shah.

Silver Variegated.—Bright Star, Flower of Spring, May Queen, Mrs. Kingsbury, Princess Alexandra, Waltham Bride.

Yellow-leaved.—Cloth of Gold, Crystal Palace Gem, Golden Fleece.

SHOW AND FANCY PELARGONIUMS.

The large-flowered or Show varieties (fig. 592) are the progeny of *P. cucullatum* and *P. grandiflorum*; the parentage of the Fancy varieties appears to be unknown. Although not so popular as formerly, they still have many admirers, large specimens being not unfrequently seen at provincial flower-shows. Mr. Turner of Slough is one of the principal growers of this section, plants 5 feet in diameter bearing 150 trusses of flowers being produced by him in about four years from cuttings.

Culture and Propagation.—Cuttings formed of well-ripened stocky growths from below the flowering wood; if inserted early in July in

sandy soil in a frame or on a shelf in a greenhouse, should be well rooted and fit for potting into 3-inch pots by the first week in September. They should be kept in a greenhouse, as near the roof-glass as possible, for the winter. Early in the spring they will be fit to place in 5- and 6-inch pots for flowering. As soon as root-action



Fig. 592.—Show Pelargoniums.

is again active, they should be stopped to form dwarf compact plants, once only if to flower in May, twice if not required until June or July. These plants will be better than older ones to grow on for the next season. After they have flowered, they should be stood in a sunny position in the open until the cuttings have been taken, then lay the plants on their sides to ripen. Early in August these plants should be cut back severely and near to the first stopping, and placed in a frame, giving no water except a daily syringe, until the plants have broken into fresh growth. They should then be repotted, reducing the balls sufficiently to get them into a size smaller pot. In spring they will require shifting into 6- or 8-inch pots, stopping being again attended to as advised. Those plants that are wanted in flower in March or April

should not be stopped during the winter, unless the growth is well advanced.

Forcing, for early flowers, should be done in a warm, light house, the plants being hardened off previous to the flowers opening. When in bloom they should be kept in a well-ventilated structure, or the flowers will soon fade. Liquid manure may be given when the plants are well established in their last shift. It is always safer in the winter to keep the plants fairly dry at the roots until quite active growth is in progress. The compost recommended by Mr. Turner is good yellow loam, well-rotted stable manure, bone-meal, coarse sand, and charcoal. For ordinary purposes, two parts of loam to one part of leaf-soil answers very well.

LIST OF VARIETIES.

Show.

- Achievement.* Orange-scarlet, upper petals maroon, white centre.
- Blue Beard.* Light-purple.
- Claribel.* Pure-white.
- Conspirator.* Rosy-salmon and maroon, light margin.
- Curtius.* Dark-crimson.
- Duke of Norfolk.* Crimson-scarlet.
- Eclipse.* Dark-rose.
- Emperor.* Light-pink.
- Example.* Deep-crimson.
- Excellent.* Light-crimson.
- Favourite.* Red and maroon.
- Heirloom.* Rich-rose.
- Indian Yellow.* Orange-salmon.
- International.* Bright-rose.
- Joe.* Rosy-purple.
- Mabel.* Dark-maroon above, clear narrow margin, rich.
- Magnate.* Fine dark.
- Maid of Honour.* Pink.
- Marguerite.* White and crimson.
- Martial.* Rich crimson-maroon above, bright margin.
- Miss Louisa Coombs.* Light-rose.
- Mrs. Coombs.* White and carmine.
- Orient.* Rose, shaded orange.
- Prelate.* Deep-purple.
- Prince Leopold.* Bright-scarlet.
- Prince of Orange.* Bright-scarlet.
- Princess Maud.* Bright-rose.
- Princess of Orange.* Deep-scarlet.
- Purpurea.* Rich-purple.
- Resolute.* Deep-rose.
- Royal Albert.* Rose.
- Royal Ascot.* Orange-scarlet.
- Sappho.* Cherry-rose, dwarf.
- Sister of Mercy.* Crimson-maroon.
- Souvenir.* Rosy-purple.
- Statesman.* Pale-rose.

Decorative.

- Alice.* Light spotted.
- Beauty of Oxton.* White and crimson.
- Black Diamond.* Lilac-purple.
- Buffalo Bill.* Lilac, blotched carmine, extra large.
- Captain Raikes.* Crimson, edged white, dark blotch, double.

Comtesse de Choiseul. White.
Dr. Masters. Dark-maroon.
Duchess of Edinburgh. White, spotted.
Duchess of York. White and carmine.
Edward Perkins. Crimson-scarlet.
Emperor of Russia. Purple and maroon, banded white.
Empress of India. Rosy-scarlet.
Gold Mine. Orange-scarlet.
Kingston Beauty. White, spotted.
Lady Isabel. Lilac, free, large trusses.
La Ville de Caen. Cerise.
Madame M. Knecht. White.
Madame Thibaut. Rich-rose, eye and margin white, fringed.
Maggie. White and purple spots.
Marie Malet. Carmine.
Master Richard. Deep-crimson.
Mr. Coombs. Pure-white.
Prince Henry. Crimson.
Purity. White.
Queen Victoria. Rich-vermilion, pale at margin, semi-double.
Radiant. Scarlet-crimson.
Rosetta. Rosy-purple.
Rosy Morn. Rosy-pink.
Spotted Beauty. Rose, dark ruby-red spots.
St. Blaise. Deep-crimson.

Fancy.

Ambadress. Soft lilac-rose.
Delicatum. White and light rose.
Dorothy. White with carmine, margin prettily fringed.
East Lynne. Crimson-purple.
Ellen Beck. Soft carmine.
Fanny Gair. Rosy-lake.
Iona. Lilac-rose.
Lady Curzon. White and purple.
Lucy. Crimson and violet.
Medina. Dark, white eye.
Miss E. Little. Rosy-purple.
Mrs. Douglas. Rose and purple.
Mrs. Hart. Crimson-purple.
Princess Teck. White, carmine spots.
Queen of the Hellenes. White, rosy spots.
Roi des Fantasies. Rosy-crimson.
Sir Hugo. Rich-crimson, dwarf.
Sybil. Rosy-crimson and white.
The Shah. Deep crimson-purple.
Thomas Ring. Carmine and white.

IVY-LEAVED PELARGONIUMS.

These are descendants from *P. pellatum* and *P. hederæfolium*. The wonderfully improved varieties recently raised are said to have had their origin in a chance cross between an Ivy-leaved variety and a Zonal variety, which was obtained in a garden in Nice by M. Jean Sisley. Since then others have made the same cross, and we have now a large number of beautiful varieties which are of the greatest value in the garden and greenhouse.

Cultivation.—As regards propagation and soil these require the same treatment as the Zonal section. A stock of these should be raised from cuttings every year, but instead of pruning them back for the next season it will be found better to grow them on, as they do not bear pruning nearly so well as the Zonals. Being of a semi-climbing or procumbent habit, they



Fig 593.—Ivy-leaved Pelargonium in Hanging Basket.

are excellent for training on screens or trellises, or as bushes with several sticks as supports. For covering walls or training up pillars in greenhouses or conservatories they are admirable, being of rapid growth. For hanging baskets or large vases, too, they are most effective (fig. 593).

LIST OF VARIETIES.

Anna Pfitzer. Salmon-rose.
Beauty of Castle Hill. Rose.
Edith Owen. Magenta.
Flambeau. Scarlet.
Galilée. Soft-pink.
Gloire de Lorraine. Light-magenta.
Jubilee. Reddish-crimson.

L'Elegante. White-edged foliage, flowers single.
Liberty. Light-magenta.
Madame Emilée Gallé. Pale-lilac.
Marguerite Jacquot. Rosy-pink.
Mrs. Cannell. Soft pale-lilac.
Mrs. Hawley. Bright deep-rose.
Old White. Single, for baskets.
Prince of Wales. Cerise.
Ryecroft Surprise. Salmon-pink.
Souvenir de Charles Turner. Deep-rose.
W. F. Dreer. Magenta-red.

SCENTED-LEAVED PELARGONIUMS.

These are mostly species or varieties modified more or less by cultivation. They are worth growing for the fragrance of their leaves alone, but many of them are also pretty flowering plants.

Culture.—Generally these require the same conditions and treatment as the Zonal and Ivy-leaved sections. They may be pruned as in the case of the Shows and Fancies, or grown on from year to year until they are too large. When large plants are grown, they are useful at all seasons, and as the shoots are at times cut for use in vases, it is not a difficult matter to keep them within bounds in combination with occasional staking and tying. Some of them are not by any means the easiest plants to manage—some being delicate growers, whilst others are vigorous for a time, and then go off suddenly. Firm potting keeps the plants sturdy, and is conducive to good health. The best time to repot any that require it is in the early spring, whether the balls be reduced or not. Immediately after repotting, close treatment for a short time will encourage vigorous root-action; the cool house is then the better place for them. Large shifts should be avoided; indeed plants which have not been repotted for three or four years will continue in good health if cared for as advised in winter. Active growth takes place in June, when an occasional watering with sulphate of ammonia, a table-spoonful in a three-gallon can of water, will benefit them. Three doses during the season will be ample. The best position for them is in the open air, in full sunshine, from the end of May until the end of September. The foliage of the highly fragrant varieties is excellent for use as *pot-pourri* when well dried.

LIST OF VARIETIES.

Strong Growers.—Capitatum (rose-scented), *Purple or Rollison's and *Scarlet Unique, quercifolium (true oak-leaf), radula (balsam-scented), tomentosum (peppermint-scented), viscosissimum, vars. Pheasant's-foot and Fair Helen.

Medium Growers.—*Ardens (scarlet flowers), Attar of

Roses (scent indicated), filicifolium odoratum (Fern-leaf), fragrans (Nutmeg-scented), graveolens, var. *Pretty Polly (Almond-scented), Lady Plymouth (variegated), Mrs. Douglas (dark-zoned), *quercifolium minor (small Oak-leaf), *Shottesham Pet (Filbert-scented).

Small Growers.—Citriodora, *Countess of Devon (a miniature "Fancy"), crispum (Lemon-scented), denticulatum major, Lady Mary (small foliage), *Prince of Orange (free-flowering), Prince of Orange (variegated), radula, var. *Little Gem (very compact).

* Denotes varieties useful also as flowering-plants. The best sorts for cutting purposes are capitatum, radula, Attar of Roses, fragrans, Lady Plymouth, crispum, and Little Gem.

[J. H.]

Pentstemon (fig. 594).—Few hardy plants have been so much improved during the last twenty years as the Pentstemon. By crossing



Fig. 594.—Pentstemon.

and selecting from *P. Hartwegii*, *P. gentianoides*, *P. Cobaea*, and others, florists have obtained a race of hardy border plants, remarkably floriferous, large-flowered, and very varied in colour.

Cultivation.—Garden Pentstemons succeed well in any good soil, but a deep and rather moist sandy loam is best. If occasionally dressed with manure and leaf-soil, they produce enormous spikes of beautiful flowers throughout summer and autumn. They can be grown in masses in beds, in groups in the herbaceous

border, or in the flower-garden to form a centre to large beds, or mingled with some other suitable plant.

Cuttings formed of barren shoots will strike at almost any time of the year, the best time being August or September; the softer the wood, the more readily do the cuttings root. Leafy shoots 4 inches long should be taken, cut just below a joint, and inserted in light sandy soil, well drained, and in pots or pans in a cold frame. Or they can be put in a warm border and covered with a hand-glass, shading them from the sun. Plants that have remained out all the summer will often live through the winter in the open border, especially if some ashes are placed about the roots by way of affording protection in severe weather.

Seeds saved from a good strain generally yield a large percentage of equally good varieties. They should be sown in shallow boxes of good light soil in February or March in a gentle bottom-heat, where they soon germinate. When the seedlings are large enough to handle, they should be pricked off into other boxes and kept in heat for a time, hardening them off before planting them in prepared beds in May or June. Plant them about a foot apart each way in good soil, and in dry weather occasional watering at the roots will keep them growing. If extra strong plants are required by May, seed should be sown in August, and the plants grown in a frame through the winter.

SELECT NAMED VARIETIES.

- Adonis*. White, suffused with lilac.
- Alfred Richet*. Bright-vermilion, white throat.
- Archibald Colquhoun*. Crimson and white, veined purple.
- Argou*. Bluish-purple, white throat.
- Berlioz*. Violet-purple, white throat.
- Bridesmaid*. Large, pure-white.
- Charles Street*. Pale-lilac, veined crimson.
- Compacta*. Scarlet, purple, and white.
- Conspicua*. Violet-purple and white.
- David Wood*. White shaded purple.
- Eclipse*. Purplish-crimson, blotched chocolate.
- Floribunda*. Blood-red, white throat.
- George Ulrich*. Scarlet, white throat.
- Henry Lister*. Rosy-purple and white, marked crimson.
- Jean Mace*. Scarlet, white throat.
- Le Niagara*. Creamy-white.
- Mont Blanc*. Pure-white.
- Mrs. Bosanquet*. Purplish-crimson.
- Serenade*. White shaded lilac.
- Surcouf*. Carmine-lake, with chocolate markings.
- Tissandier*. Rosy-carmine and white, spotted crimson.
- Victor Hugo*. Dark-lilac, white throat, spotted purple.
- William Fowler*. Rosy-lilac, white throat.
- William Lumley*. Bright-red, pencilled chocolate.
- W. M. Baillie*. Bright-scarlet, white throat.

Phlox (fig. 595).—The popular perennial border Phloxes are said to be the outcome of a cross between *P. paniculata* (*decussata*) and *P. maculata*, the former with tall, erect unbranched stems, ovate-lanceolate leaves, and large terminal panicles of lilac, purple, or white flowers;

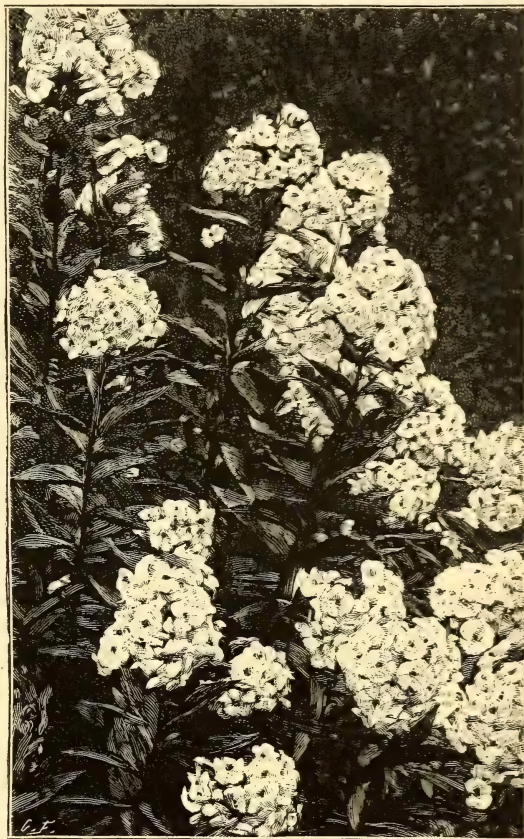


Fig. 595.—Phlox.

the latter with shorter stems, spotted with purple, the panicle of flowers narrower, the flowers fragrant, purple or white. Their progeny are popularly known as forms of *P. decussata*. Many named sorts have been raised, chiefly by M. Lemoine, Mr. Kelway, and Mr. John Forbes, and new ones are added annually. They vary in height from 1 foot to 3 or 4 feet, and there is considerable range of variation in the colours of the flowers, and also in the shape of the leaves.

Although these plants are not particular as to soil, they pay for good cultivation. They are too often left to struggle for existence with coarse herbaceous plants and shrubs, and even then they make a good display from July until the frost stops them. But to have them in perfection they should be grown in beds by themselves, a few large beds in a sunny position

on a lawn being a suitable place; if planted in a mixed border they should be set in sufficiently large groups to be effective, and their root-space should be kept free from the encroachments of their neighbours. The soil for them should be well trenched, and if manure is needed it should be mixed with the lower spit. A mulch of short, well-rotted dung or leaf-soil should be given every year in May. The plants are unfortunately subject in some soils to a fungus disease which attacks the stems at the surface of the soil. A good dressing of lime is recommended as a preventive. It is also advisable to discard those sorts which are worst affected by this disease. The plants should be lifted, trimmed, and replanted if possible in new soil about every three years.

Propagation.—It is easy to multiply these plants by means of cuttings taken from the base of cut-down plants. They should be placed in a cutting frame in slight heat and kept close as for cuttings of Chrysanthemums. When rooted they should be planted in a nursery bed for a year, where they will grow into nice stocky plants, ready for the lawn-bed or border, in March or April. They can also be raised from seeds sown in a little warmth in March. The seedlings should be grown on in a nursery-bed until strong enough to plant in borders, &c. Of course seedlings cannot be relied upon as regards colour. The stems are very brittle and easily broken by gusts of wind; they should therefore be staked early. In dry weather they require a daily watering. If the stools show a tendency to over-production of stems in spring, the superfluous ones should be taken off and used, if required, as cuttings. In planting the beds, a distance of about 18 inches between each plant is desirable, and this may prove too close for sorts that grow with great vigour. No plants are better adapted for filling large beds which have been devoted to summer bedding-plants, such as Geraniums, Calceolarias, &c. There are hundreds of named sorts; the following is a good selection:—

White.—* Albatre, Amazon, Bayardère, * Berenice, * Eden, * Fille d'Eve, * La Neige, Lawrence, Niphetos, * Purity, Sylphide, The Queen.

White with red eye.—Captain Jackson, Countess of Aberdeen, Countess of Minto, * Espoir, Longchamps, Princess of Wales.

Pink.—Alhambra, Baccante, * Belvedere, Eclaircur, Gilbert, Hamlet, Marquise de Breteuil, Molière, Mozart, Mrs. Gladstone, Parthenon, Regulus.

Red.—Angus McLeod, Claude Gillie, Coquelicot, Etna, James Grieve, L'Eclair, Montagnard, * Pandore, Roi des Roses, Sesostris, Surprise, Tom Welsh.

Purple or blue.—Acropole, Balzac, Bayard, Chateaubriand, Duguesclin, Iris, Lamartine, Ledru Rollin, Le Mahdi, Le P. Hacquart, Montrose, Suffrage.

Variegated.—Alcesti, Atlante, Crepuscule, E. Danzavilliers, Papillon, * Tunisie.

* These are less than 2 feet high.

Phyllocactus.—A very showy genus of hothouse plants, well deserving more care and attention than they usually receive. They are chiefly of hybrid origin, the largest and best



Fig. 596.—*Phyllocactus crenatus*.

varieties being mainly descendants from *P. crenatus* (fig. 596), *P. grandis*, and *P. latifrons*. The rich-coloured *Cereus speciosissimus* is also responsible for some of the most brilliant tints. They have flattened, notched stems, no true leaves, and the flowers are produced from the notches on the upper portion of the last-matured growths. For soil, a light, yellow, fibrous loam, a fourth part of leaf-mould and a sprinkling of brick and mortar rubble and coarse white sand form a suitable mixture. They do not thrive if over-potted, and, like all plants of the Cactus order, they require a season of rest in a dry atmosphere, and also to be kept dry at the roots, scarcely needing water at all for three months in winter. Propagation by seed, obtained, if possible, from cross-fertilized flowers, may result

in new and improved varieties. Cuttings of the stems root freely in the spring if placed in a warm moist house in sandy soil. There is little danger of losing them except by their damping off at the base, through over-watering. They soon fill the pots with roots, when they should be repotted into 4-inch pots in May or June; they will not require to be repotted again until the following March, when they may be put into 7-inch pots. They should always stand in a sunny position, quite unshaded, in a warm airy house. They usually assume a bushy habit, but if they show a tendency to legginess the tops of the growths should be removed. It is a good plan to turn them out-of-doors after midsummer, in a position well exposed to the sun. Let them have moderate supplies of water. They should be removed into a warm greenhouse before the cold nights. Well-established plants should be started into growth early in the year in order that they may make their growth before midsummer, to be turned out again about that time for the ripening process. This alternation of growth and of rest produces in a few years handsome flowering plants.

Within recent years excellent work has been done in the raising of new and greatly improved varieties by French, English, and American growers.

The best of the species are:—

P. Ackermannii. Stems broad; flowers rich scarlet. Mexico.

P. crenatus. Stems very broad; flowers creamy-white and orange, fragrant. Honduras.

P. grandis. Large flat stems; flowers white, fragrant. Honduras.

P. Hookerii. Stems long; flowers with long slender tube, white, fragrant. Brazil.

LIST OF GARDEN VARIETIES.

- Adonis*. Large, rose-pink; a good grower, free.
Agatha. Pink-shaded salmon.
Alice Wilson. Orange-scarlet.
Brilliant. Vivid scarlet.
Cooperii. Creamy-white, a large, elegant flower.
Delicatus. Pink-shaded salmon.
Ensign. Deep-scarlet.
Exquisite. Charming bright-rose.
Favourite. Pale-rose.
Gilbert Watson. Large white.
Hecla. Light crimson-scarlet.
Homer. Red, violet centre.
Isabel Watson. Flat-stemmed, otherwise like J. T. Peacock.
Jessica. Light soft-pink.
J. T. Peacock. Rich magenta-shaded violet, large.
Niobe. Deep-scarlet, purplish centre.
Olivette. Rose-carmine.
Orion. Orange-red, shaded with violet-purple.

Plato. Brilliant scarlet.

Refulgence. Dark glossy scarlet.

Romeo. Light-red, pale-purple edge, distinct.

Suzy Watson. Salmon-pink.

Sirius. Bright rose-pink.

Sunset. Fine rich deep-shaded crimson.

Vesta. Large white.

Poinsettia (*Euphorbia pulcherrima*) (fig. 597).

—This fine autumn- and winter-flowering plant is a native of Mexico. The red variety stands unrivalled for the brilliant colouring of its scarlet



Fig. 597.—Poinsettia.

bracts, which, when well grown, will attain a length of 9 or 10 inches, lasting long on the plant. The flowers are yellow, but inconspicuous. There is a white-bracted sort (*alba*) that is often grown as a companion to the above, but is not nearly so effective, although forming a nice contrast. The double variety (*plenissima*) has the cymose inflorescence branched, and bearing, within the outer bracts, tufts of smaller but equally high-coloured bracts, which mature in succession, and much extend the flowering season. As a winter plant for a warm conservatory, the Poinsettia has few equals. It can be brought into bloom at different times, giving a succession for eight or ten weeks. The flower-like heads of leafy bracts last long when cut, if kept in water.

Propagation.—The Poinsettia increases readily from cuttings in spring, taken off with a heel when the shoots are about 4 inches long, inserted in sand, and placed in a brisk heat; when rooted, put them singly in 3- or 4-inch pots, in good turfy loam to which is added one-sixth of leaf-mould with a little sand; they should be kept in a temperature of 68° or 70° at night, with a rise of 10° by day. The plant has an almost uncontrollable habit of running up with a single straight shoot without any disposition to branch. Young plants are grown on without stopping, but to prevent their getting up too high they should be kept all through the growing season with their heads almost touching the roof, and allowed sufficient air when the weather is fine; give enough water, and as soon as the pots get filled with roots move them into others 6 or 8 inches in diameter, using soil similar to that for the last potting, and treat as before, syringing them freely overhead in the afternoons. Towards the beginning of August, when they have made plenty of roots, they may be gradually inured to more air, and either removed to a house without fire-heat, where they can have air night and day whilst the weather is warm, or stood out-of-doors under a south wall in the full sun for a month; but before there is any approach to cold nights they must be taken inside and kept in a temperature of 50° during the night. Some of them may be put into a warm house in October, where they will come into flower, the remainder being brought into heat later on for succession. In a temperature of 55° the flowers last longer than if kept where it is hotter.

Where plants are wanted dwarf, say from 8 to 12 inches high, and in 6-inch pots, about the beginning of September, cut the shoots half-way through, 6 or 7 inches from the top, and leave them in this state upon the plants for ten days until the cut portion has become callused over; then completely sever them and place in 3-inch pots in a mixture of half sand and loam in a close frame, where they will root in about three weeks, after which give air gradually, and ultimately, as soon as they evince ability to bear it, fully expose them; move into 6-inch pots in soil as before advised, and keep them as near the glass as possible. If they show a disposition to get taller than desired, again half-sever them at a similar distance below the tops, and after they are callused as before, take them off and root them.

When the flowering is over, put the plants

in any out-of-the-way place where a temperature of 55° can be kept up, and here let them remain until May, when they should be cut down and placed in a temperature of 60°. They will here soon push into growth, when cuttings, as required, can be taken off, and the old plants destroyed or grown on if wanted. Where it is desired, they can be grown in succeeding years to a large size by giving them more root-room, cutting them well back each season before starting into growth, and removing the exhausted soil, which the spare nature of the roots allows to be readily shaken away.

Primrose and Polyanthus (*Primula vulgaris*).—One of the prettiest of native plants, whether wild in a wood or copse or hedge-row, or cultivated in the garden. It is most effective when planted in the wild garden in imitation of its position in nature, and it may be used as an edging to a flower border in partially shaded positions. Under cultivation it has varied considerably, perhaps the most remarkable of all the varieties thus obtained being the blue-flowered seedlings raised by Mr. G. F. Wilson. A very large-flowered form of the type has lately been raised and distributed under the name of Evelyn Arkwright (fig. 598). There are also purple, crimson, rose, and white sorts, some of them double-flowered. They reproduce themselves fairly true from seeds, which should be sown early in spring in boxes or pans in a cold frame, pricking the seedlings out on a moist shaded border as soon as they are large enough to handle. If to be used for filling beds for spring effect they should be grown on in rich, moist soil in a shaded position in a nursery or kitchen-garden bed until October, when they may be lifted and planted in the flower-beds, watering them in freely if the weather be at all dry. Here they may remain till May, when they will require fresh quarters for the summer. They should be lifted and broken up if an increase of stock is required; indeed single offsets make the best plants by the following spring; they may be planted in a bed as advised for young seedlings. Very choice varieties can only be kept by this annual division, and they do not always produce offsets freely.

Although there is a well-marked difference between the true Primrose and the Cowslip (*P. veris*) they are really essentially very closely related, and consequently they are supposed to have crossed in a wild state. "The cultivated

varieties, either natural or hybrid, which are generally referred to these two species are numerous. The Polyanthus, *P. variabilis*, is intermediate in character, but its origin is not known with certainty. However, as some of the forms approach the Cowslip, and some the

charming of hardy spring-flowering plants, but it receives comparatively small appreciation from the gardeners of the present period. Where Daffodils or Tulips are favourites, there also should Polyanthus find admirers. They are easily cultivated, they flower freely, and the colours of their flowers are pleasing. A bed of selected sorts, such as may be seen at Hampton Court in June, is a delightful floral picture. The laced varieties are particularly rich in colours, velvety crimson, edged or laced with gold, &c. There are numerous named varieties, but for all except exhibition purposes a packet of seeds from a reliable grower will afford plenty of variety and quality. Their cultivation is conducted on the same lines as those detailed above for the Primrose.



Fig. 598.—Primrose—Evelyn Arkwright. (3.)

stalked variety of the Primrose, there seems to be little doubt that it is a fertile hybrid between these two species, if indeed they are entitled to that rank. The colouring is endless in its variations, though limited to various shades and combinations of purple, red, and yellow. There is a curious variety called the Hose-in-hose, remarkable for the calyx being an almost exact counterpart of the corolla. Another race of cultivated varieties belongs to the Primrose, agreeing with that in having the flower-umbels sessile. The flowers are larger, however, in the so-called typical form, and hence it has received the name *grandiflora*. The varieties in cultivation are more or less double, and range from nearly pure white, yellow, and lilac, to deep crimson" (W. B. Hemsley).

The Polyanthus is certainly one of the most

Primula sincnsis (fig. 599).—This plant, as its name implies, is a native of China, and has been introduced now some sixty years; but it is within the last twenty that the greatest advance has been made in raising improved varieties, both double and single. For bouquet-making, the double white kinds are most useful, being available nearly all the year round. The single forms are most serviceable in the conservatory and greenhouse during the winter and spring months.

It is usual to raise fresh plants every year, destroying the old ones as soon as they have flowered or have ripened seeds, except in the case of any that may appear to possess some superior quality. The first sowing should be made early in March. The seeds require care in sowing or they will fail to germinate, or not come up well; in all stages, from the seed-pan up to maturity, Primulas cannot bear any approach to stagnant moisture in the soil. The soil for seeds should consist of three parts good sifted loam, one part sand, and one well-rotted leaf-mould, the latter sifted, and the whole mixed together; fill the pans to within an inch of the rim, make moderately firm, and press the surface smooth; give a gentle watering to settle the soil, and then sow the seeds evenly, lightly covering them with fine soil. The pans can then be placed in a cold frame and covered with a pane of glass, shading with paper. Little water will be required until the seedlings are visible, when a little ventilation is necessary, and as they gain strength more air should be admitted, care being taken to shade from bright sunshine. When large enough they should be pricked off into pans,

an inch apart, and returned to the frame, keeping them close and shaded until established, when they may receive cooler treatment. Their next shift should be singly into 3-inch pots, keeping them close for a few days. Shift again into 5-inch pots, taking care to develop, by means of light and ventilation, a stiff, robust habit of growth. They delight in a moderately open and rather rich compost, consisting of six parts of turfy loam and one part



Fig. 599.—*Primula sinensis*.

each of well-decomposed cow-manure, leaf-soil, and silver sand. The pots need efficient drainage, so that water may pass away freely from the roots, the soil made rather firm, and deep potting is to be preferred. After May the plants will do well in a cold frame. Water them freely during the summer, but in autumn and winter give just enough to maintain a moderate moisture in the soil. An airy position a short distance from the roof-glass suits them during winter, with a temperature not below 45 to 50 degrees.

The Chinese *Primula* is exceptionally well cultivated in the neighbourhood of Birmingham, very large specimens 2 feet or more in diameter, with large massive foliage and very fine flowers, being annually exhibited in November in the town-hall there. The Birmingham strain is quite distinct. The treatment of the plants is as follows:—

The seeds are sown as soon after ripening as possible. The young plants are pricked off

when ready, and potted into small pots when large enough. They are wintered in these pots, on shelves very close to the glass. At the turn of the year, when the plants show signs of fresh growth, they are shifted into 5-inch pots, and kept close to the glass in a genial, warm, greenhouse temperature. In June they are put into cold frames, kept close to the glass, shaded during the brightest part of day, plenty of air being judiciously given early in the day, reduced or closed altogether according to weather before the sun has left the glass. The final shift into 8-inch pots is given soon after the plants are removed into cold frames. They are allowed plenty of room during the whole growing season. Weak cow-manure water, with soot, is beneficial when the plants are well-rooted. A sharp look-out is kept for green-fly. About the middle of September the plants are moved into a cool, airy greenhouse to flower, and from November onwards many of them become perfect pyramids of bloom from purest white to deep crimson, lasting for several months in beauty. Some of the favourite sorts are:—

Duke of York, Emperor, Eynsford White, Her Majesty, Kentish Purple, Marquis of Lorne, Meteor, Mont Blanc, Princess May, Swanley Giant, White Lady, White Perfection.

Several fine double and semi-double varieties have been produced from seed; the former are increased by means of cuttings; the latter come fairly true from seed.

The old double white is largely propagated by means of cuttings planted in pots of light sandy soil in a moderate heat. Another plan, that of layering, is, as soon as the old plants have gone out of bloom fine cocoa-nut fibre is piled up among the shoots, which soon root into it; they are then taken off and potted. Some growers partly sever the shoots with a knife, in the belief that it induces a quicker root-development. [R. D.]

Pyrethrum (fig. 600).—*Pyrethrum roseum* has been so greatly improved by the florist that the fine double-flowered kinds may be said to fill such places in May, June, and July as the Aster and Chrysanthemum fill in autumn. During the last thirty years or so Mr. Wm. Kelway and others have produced numerous varieties, both single and double, by continuous cross-breeding and selection.

They thrive under ordinary conditions, responding readily to liberal treatment, and are useful either for beds or to form masses in

borders. They are propagated by division after the plants have done flowering, and also from cuttings made of the side-shoots formed at the end of the summer. These should be set in a cold frame, or under a hand-glass in a shady border. When rooted they can be planted out either in the autumn or early spring.

The double-flowered varieties do not seed easily, and the seedlings are generally inferior. The single varieties are better in this respect.



Fig. 600.—Pyrethrums.

The seed should be sown in pans in early spring and placed in a cold frame or on a shelf in a cool greenhouse, covering them with a pane of glass, and shading until they germinate.

SELECTION OF SORTS.

Double-flowered.—Alfred, Aphrodite, Duchess of Teck, Empress Queen, Ernest, Evelyn, Figaro, King Oscar, Lady Kildare, Lenoard Kelway, Lord Rosebery, Milton, Pericles, Primrose, Princess Beatrice.

Single-flowered.—Alice, Apollyon, Dorothy Kelway, F. M. Peacock, James Kelway, J. G. Clarke, Lord Roberts, Macbeth, Mary Anderson, Millicent, Pascal, Princess Irene, Princess Marie, Princess of Wales, Ruth.

Rhododendron (Hardy).—Undoubtedly the finest and best of hardy evergreens, no other genus combining so much variety of colour, so much beauty of both flower and foliage, with vigour and hardiness.

The garden Rhododendrons, as distinct from the species from which they are derived, are quite a modern acquisition. The most important of the parent species—*R. catawbiense*, *R. arboreum*, and *R. caucasicum*—have been introduced within the last hundred years. *R. ponticum*, which has also played a part in the production of the garden race, was introduced in 1763, but does not appear to have been used for hybridizing until long afterwards. Although other crosses, accidental or otherwise, had been previously obtained, the first results which may be said to have begun the evolution of the garden Rhododendrons, as we know them to-day, were obtained between 1826 and 1835. About this period the Himalayan, *R. arboreum*, introduced in 1820, flowered for the first time under cultivation. It is easy to imagine the effect of its glorious crimson trusses on people who had only seen before the comparatively ineffectual and indeterminate hues of the European and American species then in gardens. At any rate, the desire was generally felt to get some of its vivid colour into the open air (for it is, itself, only hardy in very few parts of the United Kingdom), and it was used by several hybridists between the dates mentioned. Thus were obtained *altaclerense* (*arboreum* × species unrecorded), *Nobleanum* (*arboreum* × *caucasicum*), *Russellianum* (*arboreum* × *catawbiense*), *Smithii* (*arboreum* × *ponticum*). These first hybrids, raised from *R. arboreum*, naturally retained some of its tenderness, as well as its propensity to break into flower early in the year. But a beginning had been made, and by repeated crossing and selection a hardy, later-flowering race was gradually evolved, which still retained much of the vivid colour of the Himalayan species. In fact, all that is red or crimson in the flowers of the garden race of Rhododendrons has its origin in the “blood” of *R. arboreum*. In the varieties that are most free from any purple tinge, such as Michael Waterer and Doncaster, even the foliage still bears a strong impress of that species. During the years that followed the first crosses with *R. arboreum*, several hybridists took in hand their improvement; but the most noteworthy, both as regards the length of time over which their work has extended and the results obtained, were the Waterers of Knap Hill and Bagshot. Their labours may, indeed, be said to have largely given to the great bulk of the garden Rhododendrons of the present day their chief distinctive features.

Whilst the great majority of the varieties

owe their origin in a varying degree to the four species above-mentioned, successful attempts have been made in more recent years to introduce the "blood" of other species into the open-air varieties. The results that have already been obtained by using the fragrant Chinese species, *R. Fortunei*, are full of promise. Two or three hybrids, with *R. Griffithianum*

(*Aucklandii*) as one parent, are of a singularly refined beauty, and very strikingly distinct from the old-fashioned race. *R. Thomsoni* has also been used—Ascot Brilliant is one of its progeny—but although the colour is almost equal to that of *R. arboreum*, its indifferent constitution is a drawback. A few charming varieties, hardy, but too early-flowering to be



Fig. 601.—*Rhododendron Kewense*.

of much value in the open air, have been raised by crossing *R. ciliatum* and *R. dauricum*. *R. precox* and Early Gem are of this class. The American *R. maximum* has been used also to some small extent, but its value in this connection is likely to be greater in its native country, where the climate is not so well adapted as ours for Rhododendrons generally.

The value of Rhododendrons in gardens can scarcely be overstated. Among evergreens of similar stature and bulk they stand out because of the wonderful profusion and beauty of their flowers. Most evergreens of similar character, like the Yew, Box, Laurels, Aucuba, Holly, &c., have comparatively little to recommend them beyond their foliage. The Rhododendrons, on the other hand, are almost equal to the best deciduous shrubs in flower-

beauty, and we have only to recall such varieties as Broughtoni or Charles Noble to show how striking some of them are as mere foliage plants also. They may be grown as single specimens on lawns, either as standards or in their natural form. Massed in large beds or groups, they produce magnificent effects, especially if varieties flowering simultaneously and of colours that contrast or harmonize well are brought together. As an instance of a striking combination, we may recommend a group composed of the fiery scarlet Doncaster and the charming white Mrs. John Clutton. Such groups or beds, arranged in a more or less formal manner, are admirable for supporting broad drives and promenades, or for walks that lead up to large mansions and imposing buildings. But to see Rhododendrons at their

very best, some sheltered dell or hollow is needed where they can be planted informally on the grass, and without any particular regard to their colour or time of flowering. If a representative collection is brought together, varieties may be had in flower during April, May, and June. The latter part of May and

early June, however, is the great *Rhododendron* time. The variety *Nobleanum* will sometimes be in flower before Christmas, and it keeps on intermittently till April. A few specimens are worth growing, but owing to its susceptibility to frost it is not to be relied on.

The following list is representative of the



Fig. 602.—"Ghent" Azalea.

different sorts of hardy garden *Rhododendrons*:—

Purple and lilac.—Baron Schroeder, Caractus, Charles Thorold, Everestianum, Fastuosum flore pleno, Melton, Purpureum grandiflorum.

Crimson and scarlet.—Charles Dickens, Doncaster, Frederic Waterer, James Bateman, James Macintosh, J. Marshall Brooks, John Walter, Martin Hope Sutton, Michael Waterer, Mrs. Milner, Sefton, The Warrior.

Rose and pink.—Lady Armstrong, Lady Eleanor Cathcart, Mrs. Charles Thorold, Mrs. John Kelk, Mrs. John Penn, Mrs. R. S. Holford.

Rose and pink with intense spot.—James Nasmyth, Lady Annette de Trafford, Marchioness of Lansdowne, Marie Stuart, Picturatum, Stella.

Rose and crimson with light centre.—Alexander Dancer, James Mason, John Spencer, Kate Waterer, Mrs. Charles Leaf, Mrs. Mendel.

White and blush.—Album elegans, Duchess of Connaught, Madame Carvalho, Minnie, Mrs. John Clutton,

Mrs. J. P. Lade, Mrs. S. Simpson, Mrs. Thomas Agnew, Pink Pearl, Sappho, Snowflake, The Queen.

Fortunei hybrids.—Duchess of York, H. M. Arderne, Luscombei, Mrs. Thiselton-Dyer.

Griffithianum hybrids.—Coombe Royal, Kewense (fig. 601), Manglesi.

Rhododendrons are not all equally well adapted for growing as standards, but the following are recommended:—

Barclayanum, Everestianum, James Mason, Kate Waterer, Lady Armstrong, Marchioness of Lansdowne, Michael Waterer, Mrs. Charles Thorold, Mrs. John Clutton, Mrs. Shuttleworth, Roseum elegans, Scipio.

Hardy Azaleas.—If the hardy Azaleas do not hold quite the same commanding position among deciduous shrubs that *Rhododendrons* do among evergreens, they are undoubtedly in

the very first rank. They have the same antipathy to chalky matter in contact with the roots as their evergreen allies, and are thus unsuited to gardens on a limestone formation. With those exceptions, no garden can be considered complete with the hardy Azaleas unrepresented.

The chief species from which they have been derived are of American origin, viz., *calendulacea*, *nudiflora*, *viscosa*, and *occidentalis*, hence the popular term for them of "American" Azaleas. But the European species known as *A. pontica* (*flavum*), and, in later years, the Asiatic *A. sinensis* (*mollis*), have both played a very important part. Another name that has popularly been applied to these shrubs is "Ghent" Azaleas. The first hybrids were, indeed, produced in Belgium, and many of the older varieties were extensively grown and exported thence to this country; hence, no doubt, this name. One of the first workers among Azaleas in this country was Mr. Gowen of Highclere, who crossed *A. viscosa* and *A. pontica* about the same time that he raised *R. altaclerense*, already mentioned. *A. calendulacea* and *A. viscosa* were also crossed about the same date. In recent years the most important work among these Azaleas has been done at the Knap Hill Nursery, near Woking.

In a general sense the orange and scarlet varieties have come from *A. calendulacea*; the pink, purple, and rosy shades are from *A. nudiflora*; the yellow from *A. pontica*; and the small white-flowered varieties from *A. viscosa*. In more recent times an important group originating from *A. sinensis* has come into prominence. Except that the flowers have no fragrance, these varieties are quite as charming as the others, the flowers being larger and remarkable for their exquisitely soft tints, ranging from yellow to salmon colour. They flower somewhat earlier than the others, and are thus liable to damage by spring frosts. Another group, also of recent origin, has been obtained at Knap Hill by hybridizing *A. occidentalis*—a white-flowered, very fragrant, West American species—with the older varieties. As they do not come into bloom until after the other Azaleas are almost over, they add appreciably to the length of the Azalea season. These deciduous Azaleas are amongst the most attractive of autumn-tinted shrubs, the foliage dying off in brilliant shades of red and purple.

The size and habit of these Azaleas do not render them so well adapted as the evergreen Rhododendrons for growing as single isolated

specimens on lawns, &c. They are better suited for growing in large masses or in formal beds, and thus arranged may be used in the same positions as the Rhododendrons, *i.e.* skirting walks, drives, &c. But a more admirable plan, and one which is being generally adopted, is to set apart for them a certain portion of the garden, which in May and June, when these plants flower, is most delightful.

In the early days of the hybridization and development of the Azalea, nearly every plant showing a distinguishing character, however small, was given a name. Some of these old varieties are still worth growing, but the best of them are now surpassed by the new varieties



Fig. 603.—Azalea—Duchess of Wellington.

raised at Knap Hill, and these have become so numerous that it is no longer possible to give distinctive names. As a slight guide the following named varieties may, however, be recommended:—

Ardens, *Comte de Flandre*, *Daviesi*, *Decus hortorum*, *Duchess of Wellington* (fig. 603), *Fürst Camille de Rohan*, *Gloria Mundi*, *Meteor*, *Minerva*, *Nancy Waterer*, *Ne Plus Ultra*, *Pontica grandiflora*, *Queen Victoria*, *Sulphurea*, *Triumphans*, *Viscocephala*.

Double-flowered.—*Bijou de Gendbrugge*, *Heroine*, *Louise Aimée Van Houtte*, *Narcissiflora*, *Ophirie*, *Van Houttei*.

Mollis group.—*Anthony Koster*, *Emil Liebig*, *Frans Van der Bom*, *Hugo Koster*, *Nicolas Beets*, *T. J. Siedel*.

Mollis × *Pontica*.—*Charles Rogier*, *Edison*, *Esmeralda*, *Frederic de Merode*, *General Goffinet*, *Gloire de Belgique*, *Oswald de Kerchove*, *Souvenir de Louis Van Houtte*.

Cultivation.—The general principles which are laid down in regard to the cultivation of "American plants", in an earlier part of this work apply in every respect to Rhododendrons and Azaleas. As has already been said, they will not thrive in a soil heavily impregnated

with lime or kindred substances, nor can they ever be seen at their best on shallow, dry, sandy soils. A cool moist bottom is essential. A peaty soil is undoubtedly the most suitable for them, but it is by no means indispensable. Magnificent Rhododendrons and Azaleas are growing in Britain that have never had a particle of peat about their roots. A loam of good depth and quality, thoroughly trenched and improved by a liberal addition of leaf-soil, is but little inferior to peat. Manure should not be worked into the soil nor ever placed in immediate contact with the roots, but as a mulching, applied to the surface as summer approaches, it is of great benefit.

Plants allowed to grow so that the branches rest on the ground and shade the roots, do not, when once established, often need artificial watering. Still they have to be watched in dry seasons, especially on sloping banks, or near large trees, or where the soil is not so good as could be wished. Standards, owing to the more-exposed surface of the soil, need more attention, both as regards mulching and watering. In any case, the leaves of neither Rhododendrons nor Azaleas should ever be allowed to droop for want of water at the root. As a matter of routine cultivation, pruning is not needed for either. Considerations as to the size or outline of specimens or groups may render it necessary, in which case it should be done immediately after flowering, or even before, if the flowers can be spared, so as to give as long a season of growth as possible. Large plants that have been transplanted and had their roots reduced or injured in the process, have a better chance of recovering if the top-growth is reduced at the same time.

An important item in the treatment of Rhododendrons and Azaleas is the removal of all the trusses as soon as the flowers are past, and before seed begins to form. Seed-bearing is a useless drain upon the plants, and greatly reduces the vigour of the season's growth, and, as a matter of course, the next year's supply of bloom. If seed is required for sowing, it should remain on the shrubs till the frosts slightly burst the capsules. It is scarcely ripe before.

Propagation is, as a rule, effected by grafting—in the case of Rhododendrons on *R. ponticum* and *R. catawbiense*. These stocks are admirably adapted to the garden varieties so long as the suckers they so freely produce are removed. Except in the case of standards, a close watch is needed. Grafted Rhododendrons neglected

for some years will very frequently be almost or quite smothered by the stock on which they have been worked. Azaleas are grafted on *A. pontica* (*flava*), and suckers do not seem to be so troublesome. They should be raised from seed more than they are in private gardens. Both can be increased by means of layers. The process, however, is a slow one, a layer requiring about two years to form sufficient roots to maintain a separate existence. Plants of Rhododendrons so raised are naturally more expensive to buy, but they are undoubtedly the cheaper in the end. A good deal may be done in one's own garden by layering the low outer branches of good sorts.

Rhododendrons for the Greenhouse.

—A considerable number of species of Rhododendron are too tender to be grown out-of-doors in Great Britain, and even some of those which are hardy in the warmer parts are, as a rule, happiest when grown under glass. The Himalayan species generally only just miss being hardy with us, a glass structure without artificial heat providing sufficient protection for them in any part of these islands.

The large species, such as *R. Falconeri*, *R. Griffithianum*, *R. arboreum*, and *R. grande* (*argenteum*), may be grown in large pots or tubs, but they are less likely to fall into ill-health when they are planted in a properly-prepared bed of peaty soil. This is also true of the smaller species, which, however, are preferred when grown in pots, as they can be easily moved indoors and out as the seasons change. The cultural directions given for hardy Rhododendrons may be followed for all the Himalayan species and hybrids grown under glass.

The most serviceable species are *R. arboreum*, *R. barbatum*, *R. campylocarpum*, *R. ciliatum*, *R. cinnabarinum*, *R. Dalhousiae*, *R. Edgeworthii*, *R. Falconeri*, *R. formosum*, *R. fulgens*, *R. grande*, *R. Griffithianum*, *R. Maddeni*, *R. niveum*, *R. Nuttallii*, *R. Thomsoni*, and *R. Veitchianum*.

Many hybrids have been obtained from these; the best of them are *Kewense*, *Manglesii*, *Shilsoni*, *Countess of Haddington*, *Countess of Sefton*, *Henryanum*, *Victorianum*, *Princess Alice*, *fragrantissimum*, *Sesterianum*, *præcox*, *edenense*, and *Forsterianum*.

Another section of the genus to be noticed here is the *javanico-malayanum* species and their numerous progeny, which have been hybridized with most valuable results by Messrs. J. Veitch & Sons. The species used as breeders were *R. Teysmanni*, *R. jasminiflorum*, *R. javanicum*, *R. Brookeianum*, *R. multicolor*, and *R. malayanum*.

Although these are wild on very high mountains, they will not thrive under cultivation in a house the temperature of which falls below 50°; indeed they are what we term intermediate-house plants. So far they have refused to cross with other sections of the genus, the numerous hybrids and seedlings raised by Messrs. Veitch & Sons being confined to the species named and their progeny.

leggy, they may be cut down in May and kept rather dry at the root in a close moist atmosphere. This will induce them to break freely into new growth. Large plants do well when planted in a shallow border of peaty soil. Cuttings of the ripening shoots, if placed in a warm propagating case, strike root in about six weeks. In a dry atmosphere the plants soon become infested with thrips. Mealy-bug also is apt to become troublesome. The plants should be examined and thoroughly cleaned at least twice a year.



Fig. 604.—*Rhododendron*—Multicolor hybrid.

The value of this section of the genus has scarcely a parallel among the whole of the tender shrubs we cultivate. They form leafy evergreen bushes, and produce large compact heads of tubular, wax-like flowers of clear, often brilliant colours, and they remain fresh for several weeks. The plants are always in growth, consequently they are never out of flower, fully developed blooms, buds lately matured, and new growth being usual upon plants in good health. Messrs. Veitch exhibited cut-flowers from these *Rhododendrons* every fortnight for over two years. The colours of their flowers range from pure-white to rose-pink, salmon-pink, scarlet, and deep-crimson; there are also pure-yellow varieties.

Cultivation.—A moist, partially-shaded position in an intermediate house, where the temperature in winter is never lower than from 50° to 60°, affords suitable conditions for the healthy growth of these plants. They should be potted in good sandy peat, in roomy well-drained pots, and they should never be allowed to get dry. In hot weather they should be frequently syringed. At the same time a stagnant condition must be avoided. Should the plants get

SELECTION OF SORTS.

Ajax. Bright orange-red toned with tawny-yellow.

Amabile. Flowers large, pale-flesh tinted with rose.

Aphrodite. Blush-pink suffused with white.

Apollo. Orange-red, large truss; handsome foliage.

Ariel. Flowers fully 3 inches in diameter, of wax-like texture, clear bright-yellow.

Balsaminiflorum album. Double white, large trusses.

Var. *aureum*. Bright-yellow flowers.

Var. *carneum*. Flesh-coloured tinted with rose.

Var. *Rajah*. Flower over 2 inches in diameter, bright fawn-yellow tinted with rose towards the margin.

Var. *roseum*. Rose-pink suffused with light-orange.

Baroness Henry Schroeder. Delicate blush-white.

Brilliant. Scarlet flowers, 2½ inches in diameter.

Ceres. Bright tawny-yellow.

Cloth of Gold. Light golden-yellow, large, fine form.

Conqueror. Red shaded orange, paler centre.

Duchess of Connaught. Vermilion-red; compact truss.

Exquisite. Trusses 6 inches in diameter; flowers large, fawn-yellow with a faint tinge of rose, anthers crimson.

Hercules. The largest truss with the largest flowers; fawn-yellow toned with rose-pink.

Little Beauty. Flowers in clusters of six to nine, carmine-scarlet; plant dwarf and bushy.

Lord Wolsley. Bright orange-yellow tinted with rose.

Luteo-roseum. Satiny-rose, toned with light-yellow.

Ne plus ultra. Crimson-scarlet, large globose truss.

President. Buff-yellow tinted with rose; compact habit.

Primrose. The purest primrose-yellow yet obtained.

Princess Alexandra. White with a faint tinge of blush.

Princess Beatrice. Light-yellow suffused with pink.

Purity. A beautiful white variety.

Rose Perfection. Light satiny-rose suffused with white.

Souvenir de J. H. Mangles (fig. 605). Orange-yellow suffused with rose-pink; large well-formed flowers.

Taylori. Bright-pink with white tube; very free.

Triumphans. Crimson-scarlet; a splendid variety.

MULTICOLOR HYBRIDS (fig. 604).—Obtained by crossing varieties of the *javanico-jasminiflorum*

race with *R. multicolor*, from Sumatra, a floriferous species with narrow leaves and somewhat small but brilliant flowers of different colours.

Ensign. Salmon-red toned with scarlet.

Latona. Flowers in lax trusses, cream-yellow.

Mrs. Heal. Pure white, 2 inches in diameter.

Neptune. Flowers brilliant scarlet.

Nestor. Light-buff tinted with rose.



Fig. 605.—*Rhododendron*—*Souvenir de J. H. Mangles*.

Numa. Compact globose trusses, bright orange-red.

Nysa. Clear orange-yellow faintly tinted with rose.

Ruby. Dark coral-red, compact trusses.

Richardia.—For upwards of a century *R. africana*, the Calla or Arum Lily, has been cultivated in gardens. At rare intervals other species have been introduced, but none of them became popular until after the advent of two yellow-spathed species in the early nineties. As the value of these two plants became known, attention was given to the earlier introductions, with the result that seven species are now fairly common.

Like many other genera of Aroideæ, the true flowers are inconspicuous, but they are surrounded by a large, usually handsome, spathe,

which is popularly known as the flower. Providing ordinary care is given, little trouble will be found in cultivation, but to obtain large, well-developed, clean spathes, generous treatment must be afforded. *R. africana* is the hardiest, and in places where severe winters are not experienced, is a success

when used as a semi-aquatic plant on the margins of lakes or streams. In some parts of Cornwall it has become naturalized in the rich mud of lakes, where it increases with rapidity, and in summer bears quantities of large glistening white spathes. In less-favoured localities it requires the protection of a greenhouse or frame for the winter and spring. When potted, a mixture of good loam, two parts, and rotten manure, one part, with a little sand, should be used. Abundance of water is required during growth, with frequent applications of manure-water when well rooted. By thinning out the weak shoots much finer spathes can be had. The flowering period indoors is from October to May, out-of-doors from May to October. In addition to the type there are several named forms, such as *Little Gem*, with leaves and spathes less than a

foot high; *compacta*, intermediate in size; and *gigantea*, with extra-sized spathes.

The newer species require more heat, an intermediate temperature being suitable. Like the former they require liberal feeding, but the potting material should be lighter, manure being replaced by leaf-mould or peat. They should rest in the winter, be started into growth in February, and flowered during summer. All can be readily propagated by division.

The following are the species in cultivation; all are South African:—

R. africana (aethiopica), 2 to 3 feet high, leaves sagittate, the blades often 1 foot or more long. Spathe on stout scape well above leaves, pure white, 5 to 10 inches long surrounding an erect yellow spadix.

R. albo-maculata, leaves hastate, deep-green, spotted with white. Spathe greenish-white, purple at the base,



Fig. 606.—*Richardia Elliottiana*.

small, the whole plant smaller and weaker than *R. africana*.

R. Elliottiana (fig. 606).—The first of the bright yellow-spathed species to be introduced. It was exhibited for the first time in 1892, when £600 was offered for the three plants, and refused. It is equal to *R. africana* in size, the leaves are irregularly blotched with white, the spathes are rich-yellow with a purple blotch at the base, and they may be had at almost any time of year.

R. hastata is very like *R. albo-maculata*, but the leaves are wholly green, and the spathe is greenish-yellow with a purple blotch.

R. melanoleuca grows 2 feet high; leaves green with white spots; spathe small, white, open at base, showing purple throat.

R. Pentlandii.—A yellow-spathed species similar in habit to *R. Elliottiana*, with less pointed spathes and larger unspotted leaves.

R. Rehmannii.—Singular in having lanceolate, not hastate leaves, and in its spathes being white tinted with rose.

Rose Garden (The).—Roses are beautiful no matter what their position in the garden may be. Grown in beds skirting the paths, in groups in the shrubbery, or in what is termed the wild garden, they are always effective. In many gardens they are grouped by themselves on a more or less formal plan, scindent sorts being used as a kind of framework to the smaller shrubby kinds which are planted in beds.

The most important considerations in the formation of the Rose garden are those of soil and position.

Position.—An open spot with an east or southern exposure, and sheltered from strong winds, but not shaded by tall trees or lofty buildings, is the best. If space can be afforded, a Rosery should be formed. The form and arrangement of this must, to a considerable extent, be dependent on taste, the form of the ground, and other circumstances. The walks may either be of grass or gravel; the former is cooler, softer, and when kept nicely mown, presents a better appearance than gravel. The only objection to grass is that it is unpleasant to walk upon early in the morning, late in the evening, and after wet weather; and in this respect gravel has the advantage.

Two examples of formal Rose gardens are shown in figs. 607, 608.

If space is not available for a Rosery, the plants may be accommodated elsewhere. Thus, they may be planted in beds on lawns, or along the sides of walks when the borders are filled with plants of low growth. The climbing sorts may be employed to form arbours, cover arches and pergolas (fig. 609), as screens for unsightly corners, hiding the refuse heaps, divisions between the kitchen and flower gardens, or festoons along the walks.

Soil.—The Rose prefers a rich, deep, loamy soil, well drained. Heavy clay, and light sandy

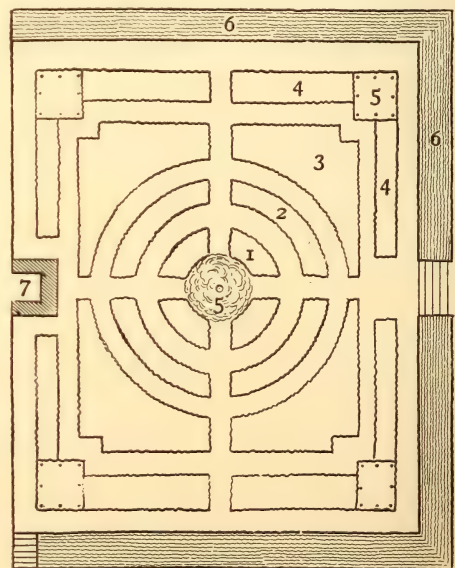


Fig. 607.—Rosery, Hatfield House (Marquis of Salisbury).
(By W. Paul & Sons.)

1, 2, 3, Standards. 4, Dwarfs. 5, Climbers on iron supports. 6, Grassy slope. 7, Old Palace (now stables).

or gravelly soil, are unfavourable, and should be replaced, either partially or wholly, with soil of the proper description. The addition of manure

will in some cases be sufficient to make the soil good for Roses. For light soils a dressing of heavy loam, in conjunction with cow-dung or night-soil, will be very advantageous. The latter is perhaps the best manure that can be used in all but very rich soils. Before using, however, it should be mixed with a quantity of loam, and laid in a heap for a year, and turned

sinking; the roots should then be spread out horizontally, within 5 or 6 inches of the surface, and covered with soil, which must afterwards be trodden firm. No manure should be placed in direct contact with the roots. Standards should be secured to stakes. None but strong and vigorous growers, when upon full standards, are suitable for lawns. After planting, the ground should be mulched with light stable-manure. Should the soil be dry, a good watering may be given immediately after planting.

In spring the ground should be dug or forked over lightly, and enriched with some well-decomposed manure. Suckers from stocks must be removed whenever they appear. If large and fine flowers are desired rather than quantity, some of the flower-buds ought to be removed. During a severe winter, or in very cold localities, the China, Noisette, and more tender Teas require slight pro-

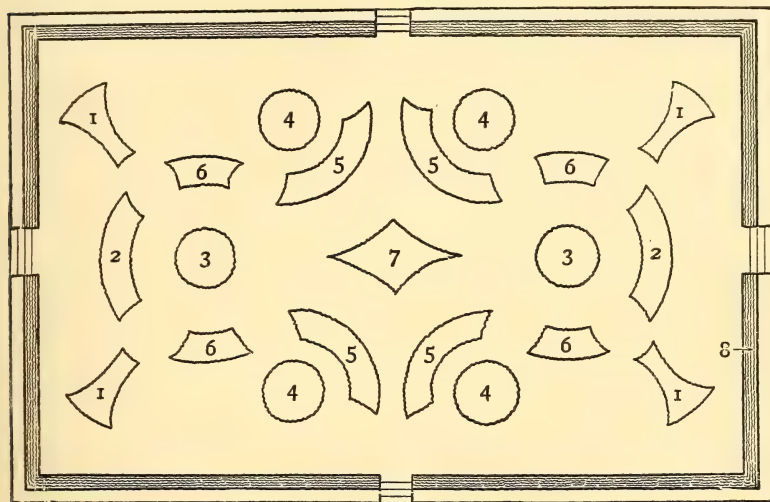


Fig. 608.—Rosery, Mentmore (Lord Rosebery).

(By W. Paul & Sons.)

Area, 130 feet by 88 feet (Grass) surrounded by walk (8), with arch covered with climbing Roses.

Beds—1, Crimson. 2, Pink. 3, Deep pink. 4, White. 5, Crimson. 6, Rose—all dwarfs. 7, Mixed Standards.

occasionally. Leaf-mould, peat, burnt earth, stable-manure, soot, or wood-ashes should be added to heavy soils. If the soil is of ordinary quality it ought to be manured every year by mulchings or dressings in winter.

Planting.—The best time for this is in October or November; but if the ground is not in good order, or is of a very stiff nature, early in spring is preferable. The Teas and Noisettes, with care, are equally hardy with the Hybrid Perpetuals. They are liable to be injured by frost if planted in autumn; this operation, therefore, should in their case be deferred till March or April, or, if the plants are very young, till all danger of frost is over, when they may be turned out from pots.

Standards should be allowed a space of 3 feet from plant to plant; dwarfs, from 1 foot to 3 feet, according as the variety is less or more vigorous; they may also be planted between standards.

Where Roses are to be planted singly on lawns, the soil should be thrown out to the depth of 2 feet, and unless it be of good quality, replaced with good fresh loam mixed with well-rotted manure. In planting, the soil ought to be filled in and slightly trodden to prevent

tection; for this purpose branches of fern, fir, or other evergreens may be employed, sticking them thickly into the ground among dwarfs, or tying them on the stem so as to protect the head of standards. A mulching of litter, short dung, leaves, or fibrous turf should likewise be placed over the roots.

Pruning.—We cut away certain portions of Rose growth in order to allow room for the better development of shoots which will afford the greatest number of good flowers. It is the nature of wild Roses to produce annually new growths from the base.

Amongst the Bourbon Roses we find a vast difference in growth between *Souvenir de la Malmaison* and *Mrs. Paul*, the first making growths 1 to 2 feet long, whilst in the latter the shoots sometimes grow to a length of 12 feet. And it is the same in other classes. The short growers, represented by *Marie Cointet* and *Laurette Messimy*, should be cut back as shown in fig. 610, leaving only the two or three lower eyes on each shoot. Such ordinary growers as *Général Jacqueminot*, *Marie van Houtte*, and *Mrs. Bosanquet*, require to be pruned as shown in fig. 611, cutting away

almost the whole of the wood represented by the dotted lines, and shortening the remainder as indicated by the crosses. Teas and Noisettes do not require this severe pruning, but the same principle should be followed for

pushing from the base. This admits of the thorough maturation of the wood to be left when the general pruning takes place.

The time to prune depends upon the class of Rose and the locality. Early in March is good for Bourbons, Hybrid Perpetuals, and all classes but Teas, Noisettes, and a few of the more tender sorts, which should be left until early in April. It is not often that the eyes start into growth early, unless the weather has been mild. It is useless to leave any unripened wood upon the plants, no matter to which section they may belong. Always cut back to a sound eye.

Pegged-down Roses.—This method consists in planting strong-growing dwarf Roses, in lines or beds, far enough apart for the strong shoots of the previous year's growth to be bent down and kept about 6 inches from the ground by means of pegs. From nearly every eye flowering wood breaks, and masses of flower are thereby produced. In August, or as soon as the flower is past, the flowering wood of the previous summer is cut away close to the ground, and three or four of the strongest shoots of the summer's growth left for pegging

down in February. Roses thus treated produce strong shoots from the base.

Culture in Pots.—Roses for the decoration of the conservatory during the winter and spring are grown in pots. If plants growing out-of-doors are selected, they should be taken up in October or November, when the shoots are ripe, and, the roots having been pruned and the heads thinned, potted firmly in 6-, 8-, or 9-inch pots, according to habit, in mellow turfy loam, leaf-mould, and well-decomposed dung in equal parts, adding a little sand. The pots should then be plunged up to the rims in coal-ashes or old tan; a layer of soot is a good preventive against the ingress of worms. Here they may remain all winter with only



Fig. 609.—Climbing Rose, forming arch.

them. A third section, represented by Gloire de Dijon and Rêve d'Or, should be pruned as shown in fig. 612, by simply removing the unripened ends of the long shoots. This is the best section for climbers and pegging-down, the last season's wood of which should be cut away as soon as it has flowered. To cut away the long rods is to destroy the crop of flowers and induce the production of more flowerless shoots so far as the current season is concerned.

Summer pruning is often desirable for strong growers, especially those used for beds, and by removing growths that have bloomed, which would otherwise produce lateral shoots at the expense of the sucker-like shoots that will be

a layer of loose litter over the pots, but the delicate sorts ought to have the protection of a cold frame; in spring they may be again plunged out-of-doors, where they may remain till October, when they may be introduced into a temperature of 50° to 55° for flowering during the ensuing winter. If young plants lately struck from cuttings are preferred, they should be shifted in spring into 5- or 6-inch pots, and plunged out-of-doors as already recommended. In July or August most of the plants will require to be shifted into 8- or 9-inch pots, and if removed in October to a pit, and later on to



Fig. 610.

the Rose house, they will bloom throughout the winter. These forced plants should be hardened off in March or April and repotted in fresh soil, using, if necessary, pots a size larger; they may then be plunged out-of-doors.

The time of pruning must be regulated by the season at which the plants are required to be in flower; for the earlier this operation is performed, the earlier will the flowers be

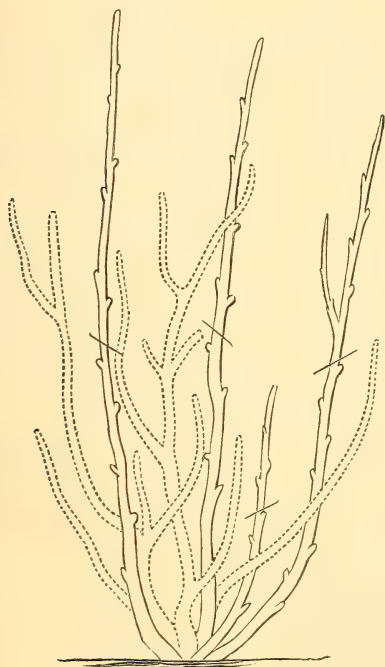


Fig. 611.

produced, provided the wood is ripe. By pruning at various periods, and by forcing, Roses may be made to flower throughout the

year. Roses grown in pots require, as a rule, closer pruning than those planted in the open ground. The shoots must be tied out at an

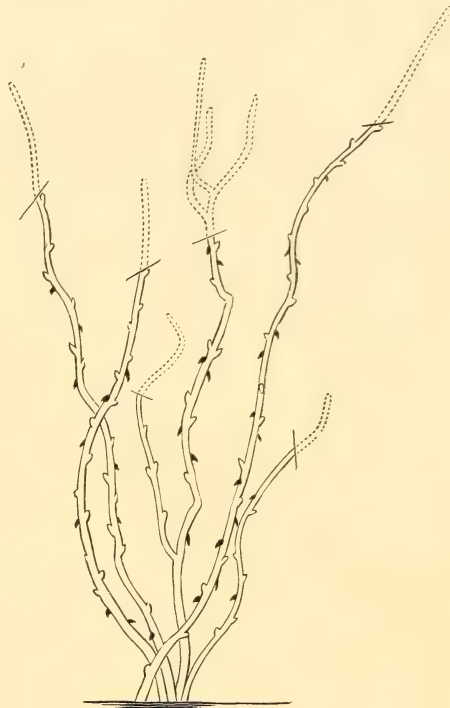


Fig. 612.

early stage of their growth, nipping off the flower-buds if not required. They should be syringed occasionally during the growing season, and green-fly, thrips, and other insect pests must be kept under by fumigation and the judicious use of insecticides. An occasional application of weak liquid manure will prove very beneficial to them. Draughts, or extremes in water-supply, are often the cause of mildew and the attacks of insect pests.

Propagation.—The Rose is propagated by seeds, cuttings, layers, suckers, buds, and grafts.

Seeds are sown usually with the object of obtaining improved varieties. Many fine varieties have been raised in this country, and home-raised Roses are now numerous. When the flowers expand, if a cross is to be effected, the stamens of the female parent ought to be removed with fine scissors, and as soon as the pollen of the male parent is ripe, it should be applied to the stigma with a camel-hair pencil. A muslin protector ought to be placed about the flower to prevent interference from insects. When ripe, the seed-pods or hips should be gathered and placed in

pots of earth or sand where they will be out of the way of mice, which would soon destroy them. Early in March the seeds should be rubbed out of the hips, sown in pans or shallow boxes filled with loam and leaf-mould, placed in a cold frame, and kept moist. Some will germinate in the course of the spring, summer, or autumn following, others not until the succeeding year. When strong enough they should be drawn, their tap-roots shortened, and replanted from 6 inches to 1 foot apart, according to size. They must be protected from severe frosts. When the plants come into bloom, the most promising should be selected for further trial, until a correct opinion as to their merits can be formed.

Cuttings of partly-matured growth may be struck at any time, but the most favourable time is about the end of September. A border of light soil on the north side of a hedge or wall should be devoted to them, and the cuttings be made 6 to 9 inches in length. The Bourbon, China, and Tea-scented sections require different treatment. In autumn, before the fall of the leaf, cuttings 4 inches long should be inserted round the edges of 4-inch pots filled with a mixture of turfy loam, leaf-mould, and silver sand, and if placed in a frame they will be rooted by the following spring. Where bottom heat is employed, the cuttings may consist of only a single joint of well-ripened young wood.

Roses may also be propagated from eyes by selecting buds of matured growth. This is an excellent plan for plants grown under glass. The cuts (fig. 613) explain themselves; all that is necessary being a gentle bottom heat and a close case for a few weeks.

Budding.—The Roses usually employed as stocks are the Celina, Boursault, Manetti, La Grifferaie, and the Dog Rose (*Rosa canina*). The Dog Rose or Brier is in general the best. Well-ripened suckers, and plants two or three years old, free from side branches, are to be preferred; and their roots having been trimmed, the tops shortened to from 6 inches to 4 feet, according to the height at which they are to be budded, and side branches removed, they may be planted in nursery rows. When the buds begin to push in spring, the whole of them should be rubbed off, with the exception of two or three situated nearest the height desired for the future plant. Brier stocks raised from seed are much used for Dwarf Roses. They are best for Teas, Noisettes, a few of the Hybrid Perpetuals, and the Hybrid Teas.

Roses upon this stock produce blooms of clear colour, and continue to flower for a long season.

The Celina stock is a good one for Bourbons and Noisettes, and may be readily propagated by cuttings.

The Manetti is an excellent stock for the free-growing Hybrid Perpetuals, Bourbons, and Chinese Roses. It is readily propagated from cuttings of mature shoots inserted early in October or November, according to season. Much the best plan is to cut them into lengths of 9 inches, carefully taking out all the eyes below the two at top, to prevent the after-growth of suckers. For light soils it is especially suited, also for pot plants, with the exception of delicate Teas and Noisettes. When planting stocks for dwarf Roses, it is very necessary to keep the crown of their roots

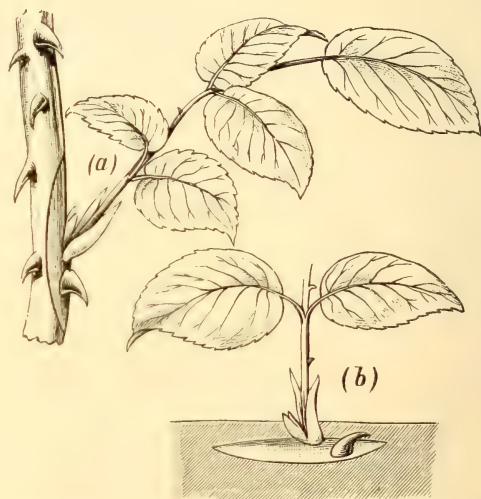


Fig. 613.—(a) Bud selected for propagation. (b) Mode of planting the Bud.

near the surface. This allows of the Rosebud being inserted close above the roots, thereby avoiding suckers.

Budding has already been fully described in the chapter on Propagation (pp. 242–245), so that a few words in addition to those already given should make the process clear.

Selecting the bud is important. If we are dealing with climbers, it is better to take buds from a strong and healthy shoot. Many of the climbing sorts, such as *Devoniensis*, soon deteriorate if buds are not selected from strong growth. The bud should also be in the best possible condition, and as nearly as can be in the same stage of growth as the stock. The illustration (fig. 614) shows a suitable shoot. The bud marked *a* is too forward, and should

therefore be rejected; *b* is a bud in the best stage. This should be cut out with a sharp knife as shown at the bud marked *c*. Turn back the bark at bottom, and, seizing the



Fig. 614.

tongue of wood between the point of your knife and thumb, detach it with a slight jerk. If the bud is full at the base, it is in the right condition. This is important, as a complete union and full support from the foster-sap cannot otherwise be secured.

Standards should be budded when the new growths are some 3 feet in length, and the bark close to the stem lifts easily. When force is necessary to raise the bark, the chances of a quick and perfect union are remote. Dwarf stocks are ready at any time while in active growth, and seldom cling in the way standard Roses do (fig. 615 represents a budded shoot on a standard Brier). It is advisable to plant out all stocks for Roses in rows, lifting and replanting them the second autumn after budding. Standard Briars may be planted 1 foot apart in the rows, which should be $3\frac{1}{2}$ feet apart. Seedling Briars intended for dwarfs should not be stouter than a cedar pencil, and will soon swell large enough for budding. Let these be planted the same distance apart as the standard Briars, if intended for strong growers. Short and compact growers, such as Lady Mary Fitzwilliam and Baroness Rothschild, may be worked upon stocks 2 feet from row to row. All dwarf stocks need shallow planting in order to allow of the Rosebud being inserted close upon their roots. Plant shallow,

and earth up the stems in much the same way as Potatoes. This will ensure more moisture, and when the earth is removed, previous to budding, the bark will lift more easily and with less liability to break.

It is preferable for the buds to lie dormant until the end of the season after they are inserted. The following spring, at pruning-time (but not before), cut the stock back to within 2 inches of the bud, when the whole strength and nourishment of the foster-roots will be thrown into the bud and future plant. The time to bud must be regulated according to the condition of the growth from which the buds are to be obtained; but, as a general rule, July, August, and the first half of September are most suitable.

Grafting.—Although budding is the method usually employed for Roses, grafting also has its advantages. It is generally practised for the increase of pot Roses and tender varieties under glass during winter, plants so treated making good examples by autumn. Healthy and well-matured shoots should be selected, the best wood being that from plants grown and ripened under glass. The stocks may be lifted from the open, and laid into some light soil under cover for a few weeks to slightly excite the sap, then grafted and potted up at once. This is much the easiest way. Fig. 616 illustrates side- or whip-grafting. A scion of ripened wood, about $2\frac{1}{2}$ inches in length, and having two or more eyes if closely together, is selected.

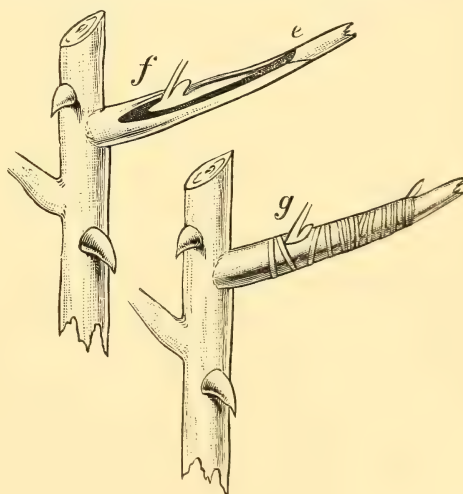


Fig. 615.

This is cut as shown in fig. 616, which also represents the prepared stock. The cuts should correspond in every way, so as to admit of a perfect fit when placed together. All that now

remains is to tie securely, pot up the stock, and place it in a bottom heat of 65° to 75° . Gradually admit light and air as the young plants progress, potting them on into a good compost. The second method of grafting (fig. 617) is employed when the wood of the stock is full of sap, and also for green or growing wood of delicate varieties. In either method the sap should be active. Prepare the scion as in fig. *a*, not making one straight cut, as in the first method, but cutting the scion so as to

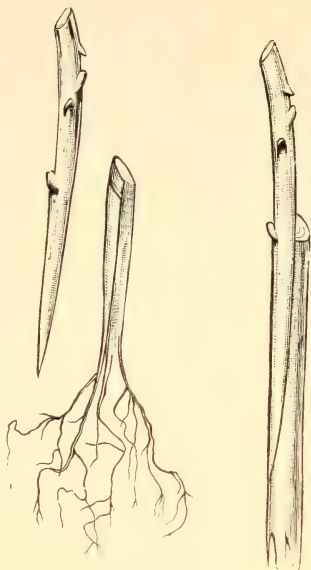


Fig. 616

form a seat or rest (see fig. *b*). This is to rest upon the top of the stock (*c*) when cut off as near to the root as possible, and so as to allow of the scion being inserted beneath the raised bark (*d*), which should be lifted in the same manner as in budding. Slip the scion beneath the bark, and press it down until the seat (*b*) rests upon the top of the stock, and the whole resembles *e*. Tie securely, and treat as in the first method described. It often occurs that suckers form upon the roots of stocks while under the influence of heat.

These must be removed as soon as noticed.

Classification.—Botanists divide the genus *Rosa* into eleven groups, each typified by a species, *i.e.* *Banksianæ*, *Bracteata*, *Canina*, &c. These are again subdivided into about 130 species, and first hybrids. In gardens, however, this classification is unworkable, so many of the species and hybrids having been crossed and recrossed. It has therefore become neces-

sary to group Garden Roses according to their habit, time of flowering, fragrance, &c., under such names as Hybrid Perpetual, Monthly, Tea-scented, Moss, &c. Generally, however, there is a botanical relationship among the members of each group, so that an acquaintance with the main features of the groups renders their classification easy, even when the plants are not in flower. These distinctive characters are, however, likely to disappear owing to the intercrossing of the groups, and we have already what are called Hybrid-Teas, Polyantha \times Hybrid-Perpetual, Rugosa \times Teas, &c., names which indicate the nature of the crosses.

There are evidences of an increased interest in what are termed botanical Roses, even the species finding favour as decorative garden-plants. The most noteworthy of these are mentioned in the chapter on "Hardy Trees and Shrubs". Some of them are also included in the following classified list. Most of those described here are, however, either hybrids or well-marked varieties.

SUMMER ROSES.

PROVENCE ROSES.—The individuals composing this group owe their origin to *Rosa centifolia* (fig. 618), a

Fig. 618.—*Rosa centifolia*.

native of the Caucasus. The old Provence or Cabbage Rose was well known in this country previous to 1596. The flowers are generally of a globular shape, and being

very odoriferous, are largely grown in the Levant for making rose-water. All the varieties are perfectly hardy and deliciously fragrant, mostly of moderate or dwarf habit of growth, requiring rich soil, to be rather closely pruned, and all should be grown upon their own roots. Amongst the best varieties of this group are:—

Common or Cabbage. Large, rosy-pink; vigorous.

Cristata or Crested. Rose; calyx fringed, giving the buds a crested appearance.

Reine de Provence. Large, lilac-blush; vigorous.

Striped Unique. White, striped with lake, but apt to lose its striped character if planted in rich soil.

Unique, syn. *White Provence*. Pure-white; flowers large and full.

MINIATURE PROVENCE, or POMPON ROSES, being of very low growth, are frequently planted as edgings to beds, or in small beds by themselves, and for pots.

De Meaux (Pompon). Rosy-pink and lilac, a beautiful little Rose.

Dwarf Burgundy. Very small, pale purplish-pink.

Little Gem. Crimson, very mossy.

Oeillet. Rosy-pink, fringed.

Spong. Small, pale rosy-lilac.

White Burgundy. White, shaded pink.

MOSS ROSES.—Supposed to have originated as a sport from *R. centifolia* in 1596. In confirmation of this supposition, we often find the flowers of the Cabbage or



Fig. 619.—*Rosa Gallica*.

Provence Rose with the calyx heavily clothed with moss. Moss Roses are best upon their own roots; and they should have a rich soil in, if possible, a warm south-west aspect. They may be more severely pruned than other Roses of similar vigour.

Alice Leroy. Lilac, shaded with rose; vigorous.

Angélique Quétier. Rosy-lilac; vigorous.

Baronne de Wassenæer. Bright-red; in clusters; vigorous.

Captain Ingram. Dark velvety-purple.

Celina. Rosy-crimson, shaded purple; moderate grower.

Common or Old Crested. Pale-rose; vigorous, first-rate.

Comtesse de Murinais. White, large and double.

Cristata. A crested form of the common Moss.

Gloire des Mousseux. Very large, blush.

John Cranston. Crimson and purple, medium, vigorous.

Lanei. Rosy-crimson; vigorous.

Madame Edouard Ory. Deep rosy-carmine, vigorous, and a perpetual bloomer.

Muscosa japonica. Crimson; leaves, calyx, and stem mossed.

Nuits d'Young. Blackish-crimson; moderate habit.

Princess Alice. Blush, pink centre; vigorous.

Princesse Adelaide. Pale-rose; vigorous.

Quatre Saisons Blanche. White, in clusters, vigorous.

Salet. Bright-pink, perpetual.

Souper et Notting. Deep-pink, large and globular, perpetual bloomer.

Unique. Pure-white, large and full.

White Bath. White, one of the best.

Zenobia. Satiny-pink, large; good for pot-culture.

DAMASK (*Rosa Damascena*) and FRENCH (*R. Gallica*, fig. 619) ROSES.—These so closely approach one another that we may class them together. They are hardy, exceedingly sweet-scented and free-flowering. The old Red Damask is a self-red form of *Rosa Mundi*; the latter with Village Maid often being confused with the true form of York and Lancaster. They will grow in any garden soil; at the same time they respond to generous treatment. The best varieties are:—

Adèle Prevost. Blush-white.

Boula de Nanteuil. Crimson-purple.

Commandant Beaufrepère. Bright-pink, striped with purple, violet, and white.

Duchess of Buccleuch. Dark-rose, blush margin.

Madame Hardy. Large, white; vigorous.

Rosa Mundi. Red, striped white, occasionally all red.

Village Maid. White, striped with dull-red.

York and Lancaster. Pale-flesh, striped with purple.

ALBA ROSES.—Obtained from *R. alba*, whose glossy leafage is characteristic of the group.

Blanche Belgique. Free, white.

Celestial. Light-blush; attractive bluish foliage.

Felicité. Blush and rose.
Madame Legras. White, creamy centre.
Maiden's Blush. Soft blush, dark centre.

HYBRID CHINESE, HYBRID BOURBON, and HYBRID NOISSETTE ROSES.—These have sprung from the Provence and French, crossed with the Chinese, Bourbon, and Noisette Roses. They are vigorous, very hardy, and abundant bloomers. The more vigorous kinds are well adapted for standards or pillars. They require the shoots to be well thinned in autumn, and shortened a little in spring.

Baron Gonella (H. B.). Bright-rose, shaded bronze.



Fig. 620.—Rose Blairii II.

Blairii II. (fig. 620). Rosy-blush; good for wall or pillar.

Brennus. Large, bright-crimson.
Catherine Guillot (H. B.). Beautiful rosy-lilac, large.
Charles Lawson. Vivid rose, large and double.
Chénédolé. Large, light-crimson; good for pillar.
Comtesse de Lacépède. Blush, centre rose, large and full.
Coupe d'Hébé (H. B.). Deep-pink; vigorous.
Frederick II. (H. B.). Crimson-purple; vigorous.
Fulgens. Bright-crimson; vigorous.
Juno (H. B.). Very large, pale-rose; vigorous.
Madame Plantier (H. N.). Pure-white; vigorous.
Madeline (H. N.). Cream, edged with crimson.
Miss Ingram. Blush-white, globular, large and full.
Paul Perras (H. B.). Large, pale-pink; good for pillar.
Paul Ricaut (H. B.). Rosy-crimson; vigorous.
Paul Verdier. Light carmine-red; first-rate.
Reine Victoria (H. B.). Bright-pink; large.
Vivid. Crimson; a fine climbing Rose.

SCOTCH ROSES OR BURNET.—These originated from *R.*

spinosissima (fig. 621), a low spiny bush, indigenous to Britain, Europe, and Siberia. They produce an abundance of small globular flowers early in spring, even in poor soil. They are suitable for forming low hedges. There are purple, red, blush, yellow, or white varieties. Three of the most noteworthy are *altaica*, 6 feet high, with white flowers; *hispida*, 6 feet high, with yellow flowers; and *Stanwell Perpetual*, clear pink, very fragrant.

AUSTRIAN BRIER ROSES.—This group is descended from *R. lutea*, a yellow-flowered species, native of Italy, Germany, and the south of France. They are very hardy, succeeding best in a rather poor soil, but with the exception of the variety *Harrisoni* will not bloom well in a smoky atmosphere. The flowers being borne on the extremities of the shoots, very little pruning is needed; the head, however, must be well thinned.

Austrian Copper (fig. 622). Single; reddish-copper.

Austrian Yellow. Bright-yellow; flowers single.

Harrisoni. Golden-yellow; free, semi-double.

Persian Yellow. Large, deep-yellow; semi-double.

The DOUBLE YELLOW ROSE (*R. sulphurea* or *hemisphaerica*), a native of the Orient, is remarkable for its large, deep-yellow flowers, produced singly and seldom opening well. Except in very favourable situations it does not succeed in this country.

SWEET BRIERS AND THEIR HYBRIDS, or EGLANTINE ROSES (*R. rubiginosa*), a native of Britain and Europe, is familiar to all as the Sweet Brier. The beautiful hybrids recently raised by the late Lord Penzance, by crossing it with the Austrian and Persian Briars, the Damask and Gallica Roses, &c., are a valuable addition to Garden Roses. They grow with great vigour, and flower profusely. Their colours are pleasing, and whilst the individual blossoms soon fall they are quickly followed by more. A few of them are double-flowered. They form nice specimens upon a lawn, and are effective in groups in large borders of flowering shrubs, or as fences or screens.

Amy Robsart. Deep-rose.

Anne of Geierstein. Dark-crimson.

Brenda. Blush, with bright-golden anthers.

Flora M'Ivor. White, flushed with rose.

Green Mantle. White, flushed with green; edges pink.

Jeannie Deans. Semi-double, scarlet, in clusters.

Lady Penzance. Coppery-red, Austrian Copper being one of its parents.

Lord Penzance. Fawn, with yellow centre; from Sweet Brier and *Harrisonii*.

Lucy Bertram. Deep-crimson, semi-double.

Meg Merrilees. Deep-crimson, very free.

Rose Bradwardine. Clear rose.

BOURSAULT ROSES.—These owe their origin to *R. alpina*, a native of the Alps, Pyrenees, &c. They are very hardy, growing vigorously, and blooming freely, even in unfavourable situations. In pruning, the shoots ought to be thinned, and shortened a little.

Amadis. Large, semi-double, deep-crimson.

Blush Boursault (De l'Isle). Large, double, blush.

Elegans. Semi-double, rosy-crimson.

Gracilis. Full, rosy-red.

AYRSHIRE ROSES.—Some of these are from *R. capreolata*, a variety of *R. repens* (fig. 623), a British species, a trailing shrub with white flowers and small red globose hips; whilst others are the result of crosses between this and *R. indica*, &c. They grow rapidly, and are well adapted for covering walls, fences, banks, and pillars.

as well as for cultivation as weepers. They require no pruning except to reduce their size when overgrown.

Countess of Leven. Creamy-white, semi-double.

Dundee Rambler. Small, double, white.

Ruga. Large, double, pale-flesh.

Splendens. Large, semi-double, white, red margin.

Thoresbyana. Small, double, white.

EVERGREEN ROSES.—Forms of *R. sempervirens*, a Euro-



Fig. 621.—*Rosa spinosissima*, var. *altaica*.

pean species. They are only sub-evergreen, retaining their foliage till late in winter. They are hardy and very vigorous, producing their flowers in large clusters. They are fine pillar and weeping Roses. The shoots should be merely thinned in pruning.

Félicité Perpétué. Cream-white.

Flora. Pink, full.

Léopoldine d'Orléans. White, shaded with rose.

Myrianthes Rénonculé. Blush, rose margin.

Princesse Marie. Reddish-pink.



Fig. 622.—Rose Austrian Copper.

Rampante. Pure-white.

Russelliana. Crimson.

Spectabile. Large, rosy-lilac.

William's Evergreen. Creamy-white.

MULTIFLORA ROSES.—There has been considerable confusion in this class, the fact being that it represents two totally distinct groups. *R. multiflora* is a vigorous-growing species from China and Japan, with large clusters of small white single flowers not unlike those of the Bramble.

This has been called *R. polyantha*, a name also given to a hybrid between it and *R. indica* (fig. 624), which has single white flowers sometimes 3 inches across. Still another set, known as Polyantha Perpetual Roses, is that which includes the Fairy or Miniature Roses, sometimes called *R. Laurenciana*. Thus, under the name of Multiflora Roses we have extremes in growth ranging from 1 to 15 feet; while some are perpetual-blooming, others flower only in early summer. To simplify matters

we have divided them into groups according to their growth.

I. Varieties with shoots 8 to 12 feet long; useful for pillars, fences, arches, &c.:—

Claire Jacquier. Small, double, nankeen-yellow, in large bunches.

Crimson Rambler (fig. 391). Bright-crimson, semi-double, immense trusses; leaves deep glossy-green,

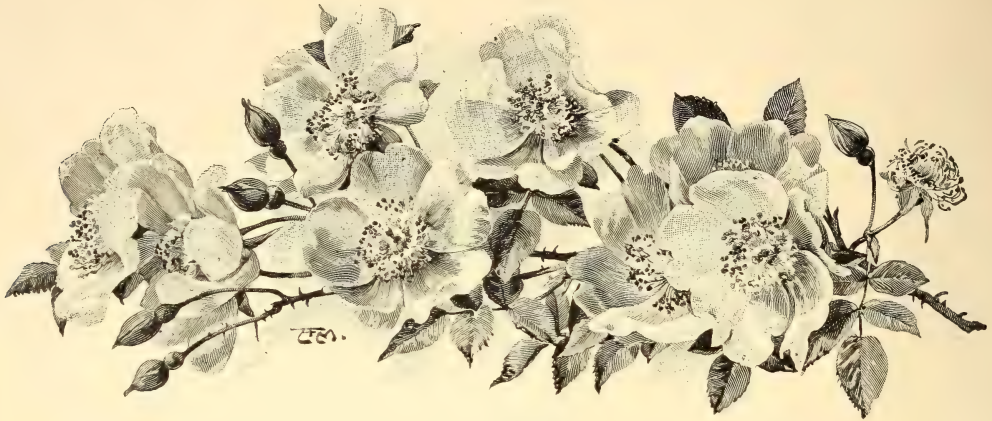


Fig. 623.—*Rosa repens*.

almost evergreen; extra strong. Suitable for pyramids, and for any climbing purpose.

De la Grifferaie. Blush; sometimes used as a stock.

Fair Rosamond. Rosy-pink, large.

Laure Davoust. Pink, double.

II. Dwarf-growers—shoots rarely exceeding 1½ feet. The Fairy Roses are included here. They are remarkable for their large trusses of blossom, produced in constant succession. Most suitable for edges of beds and borders, also for pots.



Fig. 624.—*Rosa indica*.

Annie Marie de Montravel. White, full and imbricated.

Cecile Brunner. Rose, yellowish centre; very sweet.

Clothilde Soupert. White and red; sometimes self-coloured.

Georges Pernet. Yellowish-rose and peach.

Gloire des Polyanthos. Rose, white centre; sweet-scented.

Golden Fairy. Buff, white edges; variable.

Little Dot. Soft-pink, carmine edges.

Ma Paquerette. Pure-white.

Mignonette. Rose and white.

Perle d'Or. Deep nankeen-yellow, orange centre.

The Pet. White, rosy edges.

HYBRID CLIMBING ROSES.—The Roses forming this

group are hybrids, some of the Musk Rose, others of *R. multiflora*. They are extremely vigorous, and bloom in great profusion.

Fortune's Yellow. Orange-yellow, semi-double.

Madame d'Arblay. Double, white.

Madame V. Morel. Carmine-rose and cerise, small, in clusters.

The Garland. Fawn and blush, changing to white.

BANKSIAN ROSES.—The origin of these is *R. Banksia*, a native of China. They grow vigorously, often 15 to 20 feet high, and bloom freely and early. Being rather tender they should have the protection of a wall with a south aspect and a warm dry soil. In pruning, it is merely necessary to thin out badly-ripened shoots, and to take off the points of those left. There is sometimes confusion

between *R. Banksie* and *R. Fortuneana*. The former is the true double-white, produced in clusters, and with an exquisite Violet perfume. *R. Fortuneana* (*Banksie alba*) is larger, the flowers are invariably produced singly and sparsely, while the foliage is shining and smooth upon both sides, and the peduncles extra bristly. It is said to be a hybrid between *R. Banksie* and *R. Fortuneana*.

Alba. Small, pure-white, very fragrant; in crowded clusters.

Fortuneana. White, of large size; solitary.

Lutea (fig. 625). Small, single, bright-yellow; in clusters; very free.

AUTUMNAL ROSES.

MACARTNEY ROSES.—The varieties constituting this small group have been obtained from *R. bracteata*, an almost evergreen species, brought to this country from

China by Lord Macartney. They are all rather tender, requiring the protection of a wall with a sunny aspect. The best are:—*Alba Simplex*, white, single; and *Maria Leonida*, white, blush centre; showy foliage.

MUSK ROSES.—From *R. moschata*, Europe and China. They are remarkable for the musk-like odour of their flowers and long, somewhat rambling habit; suitable for training on pillars, &c., in warm situations, and against walls in cold ones, flowering abundantly in the autumn. Some of them are hybrids between *R. moschata* and *R. indica*.

Double White. Yellowish-white.

Nivea. White, tinged with rose.

Princesse de Nassau. Cream-white, very fragrant.

Rivers' Musk. Rosy-lilac, small, very double.

PERPETUAL MOSS ROSES.—Obtained by crossing the



Fig. 625.—*Rosa lutea*.

Moss Rose with Hybrid Perpetuals. They are less mossy than the true Moss Rose. They require a rich soil and close pruning, flowering in summer and autumn.

Alfred de Dalmas. Rose-edged, rosy-white, in clusters.

Eugène de Savoie. Bright-red, full.

Eugénie Guinnoiseau. Cherry-red to violet, large.

James Veitch. Violet and crimson, large and double.

Madame Edouard Ory. Bright-carmine.

Madame William Paul. Bright-rose, large and full.

Perpetual White. White, well-mossed; vigorous.

Raphael. Flesh-colour, large and full.

NOISSETTE ROSES.—Supposed hybrids between the Musk and the China Rose, introduced by M. Noisette of Paris. Flowers in large clusters throughout the season till late in autumn, succeeding with ordinary cultivation either as standards or dwarfs. The strongest growers may also be grown as weepers or climbers, and need little pruning. These and the Teas are now so intermixed that, for all practical purposes, they are the same.

Aimée Vibert (fig. 626). Pure-white.

Alister Stella Gray. Deep-yellow, orange centre, in trusses; vigorous.

Bouquet d'Or. Deep-yellow, large and full.

Caroline Kuster. Bright orange-yellow; extra fine.

Céline Forestier. Rich sulphur-yellow.

Cloth of Gold. Yellow, pale margin; vigorous. Requires a wall with a warm aspect.

La Biche. Pale-flesh, very large; fine for pillars.

Lamarque. Large, yellow; vigorous. Requires shelter.

L'Idéal. Yellow and coppery-red, fragrant and free.

Maréchal Niel. Bright golden-yellow, large and perfect form; a magnificent Rose for a wall or under glass.

Ophir. Nankeen and copper.

Rêve d'Or. Deep-yellow, very free; needs little pruning.

Solfaterre. Bright-sulphur; vigorous. Requires a wall.

Triomphe de Rennes. Light-canary, large, fine form.

William Allen Richardson. Orange-yellow and creamy-white, variable. Good on a wall.

CHINESE ROSES.—These have sprung from *R. indica*, a native of China, and introduced into this country in 1796. They are for the most part of dwarf habit, and being tolerably hardy, may, in the warmer parts of the kingdom, be planted in the open ground; but in cold localities the shelter of a wall is requisite, and in either case protection should be afforded in winter by spreading a layer of tan or litter over the roots, or by sticking evergreens, furze, or fern among the branches. *R. indica* has had a share in the origin of many classes, and imparts its almost perpetual-blooming qualities to the Teas, Noisettes, Bourbons, &c.

Cramoisis Supérieure. Rich-crimson, very free.

Ducher. Pure-white, good form.

Eugène Beauharnais. Amaranth, dwarf.

Fabvier. Bright-scarlet.

Laurette Messimy. Rose, with yellow base, distinct.

Little Pet. White, small, free-blooming.

Mrs. Bosanquet. Pale-flesh; vigorous, extra.

Old Blush.—The common Monthly; pale-pink, one of the best.

Old Crimson. Deep velvety-crimson.

Red Pet. A miniature form of the above.

JAPANESE or RAMANAS ROSES.—These are from *R. rugosa*, remarkable for its leathery rugose leaves, large cupped flowers, and very showy hips. They need no protection,

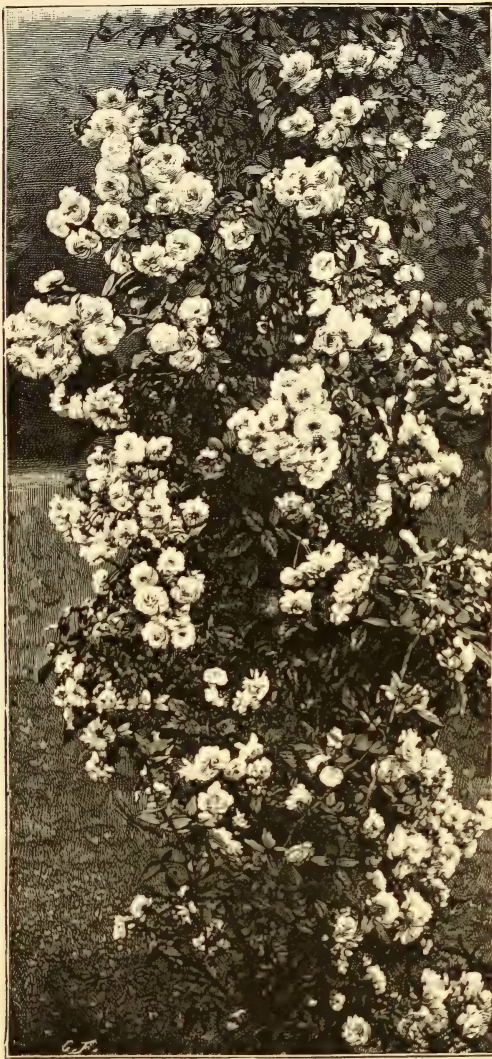


Fig. 626.—Climbing Rose Aimée Vibert.

pruning, or high culture. In the shrubbery they are most pleasing; also as groups in parks, or to form hedges or cover. They flower continuously from June till late autumn, and the flowers are succeeded by clusters of large bright-coloured hips.

Alba. Pure-white, single.

Alba fimbriata. White, fimbriated blossoms.

America. Crimson-lake, single.

Blanc double de Coubert. Dwarf, vigorous; large, semi-double, snow-white flowers.

Calocarpa. A hybrid between *rugosa* and *indica*, producing enormous bunches of scarlet hips; the flowers a clear rose, large, and very showy.

Iwara. A hybrid between *rugosa* and *multiflora* of Japanese origin. There are numerous other hybrids, this species crossing freely with most of the groups.

Kamshatika or *Yvara.* Deep-rose, very early.

Madame Georges Bruant. A semi-double white, extra good and free-flowering, but carrying no hips.

Rubra. Rose, single.

For other species and hybrids see chapter on "Hardy Trees and Shrubs".

HYBRID PERPETUAL ROSES.—The parents of this group are the Damask, Bengal, Chinese, Bourbon, and others. It combines the dark and clear pink shades of the Damask with an extended time of flowering, and is perhaps the most popular of the races of garden origin. Selected seedlings as well as crosses and sports have been the means by which this very extensive group has been obtained. Particularly free in growth and bloom, thriving better than any others near towns and in cold localities, they have become indispensable. So numerous are the varieties—many being added yearly—that it is impossible to give more than a limited selection of sorts of well-known merit, and there are many others of first-rate quality. There are probably 2000 named sorts in cultivation.

Dwarf-growers, 2 to 3 feet, suitable for grouping or for pot-culture:—

Baroness Rothschild. Clear-rose.

Emilie Hausburg. Rose, edged with white.

Gustave Piganeau. Bright-carmine.

Harrison Weir. Velvety-crimson.

Madame Charles Wood. Crimson and rose.

Marchioness of Downshire. Two shades of pink.

Marchioness of Londonderry. Ivory-white.

Merveille de Lyon. White, tinted with rose in bud.

Triomphe de Cuen. Bright-crimson.

Medium growers, 3 to 5 feet:—

A. K. Williams (fig. 627). Red to magenta.

Alfred Colomb. Bright-red.

Camille Bernardin. Bright-crimson.

Charles Lefebvre. Deep-crimson.

Comtesse d'Oxford. Carmine, shaded maroon.

Duchesse de Morny. Rose, silver-edged.

Dupuy Jamain. Bright-cerise.

Fisher Holmes. Two shades of crimson and scarlet.

General Jacqueminot. Scarlet. An old favourite.

Heinrich Schultheis. Pale-pink; early.

Madame Lacharme. White; first-rate for pots.

Madame Victor Verdier. Cherry-red; good late.

Marie Baumann. Bright-red.

Marie Verdier. Pure-rose.

Maurice Bernardin. Vermilion, shaded darker.

Mrs. John Laing. Soft-pink; excellent for all purposes.

Mrs. R. G. S. Crawford. Deep-rose.

Paul Neron. Deep-rose, very large.

Prince Camille de Rohan. Scarlet and maroon.

Suzanne M. Rodocanachi. Clear, bright-pink.

Victor Hugo. Bright-crimson, shaded darker.

Vigorous growers, 5 to 8 feet:—

Abel Carrière. Purplish-crimson.

Baron de Bonstetten. Deep velvety-crimson.

Benoît Comte. Bright-red.

Captain Hayward. Carmine-red.

Duke of Edinburgh. Bright-vermilion; vigorous, free.

Earl of Dufferin. Crimson and maroon.

Her Majesty. Satiny-rose, extra large.

Jules Margottin. Bright-carmine.
Madame Gabrielle Luizet. Silvery-pink, lighter edges.
Margaret Dickson. White, rose centre.
Pierre Notting. Crimson and violet.
Pink Rover. Pale-pink.
Ulrich Brunner. Cherry-crimson.

BOURBON ROSES.—The origin of these is not positively known; probably a hybrid between the Bengal and another. Although few of the older varieties, if we except *Armosa* and *Souvenir de la Malmaison*, are first-class,

there are many beautiful early and late varieties among the newer ones. The tall vigorous growers are suitable for pillars, &c. A few of the best are:—

Acidalie. Blush-white, vigorous.
Armosa. Deep-pink, free, compact.
Climbing Souvenir de la Malmaison. A free-growing sport from the old favourite.
Gloire de Rosomanes. Bright-crimson, semi-double.
Kronprinzessin Victoria. A yellow-tinted dwarf sport from *Malmaison*.



Fig. 627.—Rose A. K. Williams.

Lorna Doone. Magenta, shaded scarlet, very free.
Madame Isaac Pereire. Light-carmine, large and full; a grand pillar Rose.
Mrs. Paul. White, shaded soft-lilac; an immense grower.
Sir Joseph Paxton. Rosy-crimson, early flowering, vigorous.
Souvenir de la Malmaison. Clear-flesh, one of the best late Roses.

TEA-SCENTED ROSES.—Of hybrid origin, *R. indica* being the principal parent. They are exceedingly useful, and many improvements, both in colour and shape of flower, have been made in recent years, so that most of the new varieties are more vigorous and hardy than the old. As a matter of fact, Tea Roses are not so tender as is supposed, but owing to their early and late period of growth their shoots are apt to be hurt by frost. Whether for pot-culture or to train against the roof of a conservatory, on walls, fences, pergolas, or in beds, they are invaluable. Although not so full and firm in texture, or so rich in red shades of colour, as the Hybrid Perpetuals, they are superior in delicacy of colour and elegance of form. Neither the Teas nor the Noisettes suffer from red-rust, so destructive to H. P.'s; they are also exceptional in that they bloom continuously from early summer until severe frost stops them. Many of them are exquisitely scented.

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Dwarf-growers, 2 to 3 feet, suitable for beds on lawns and for pot-culture:—

Adam. Rose and salmon, large, very sweet.
Beauté Inconstante. Coppery-red, flushed with carmine.
Cleopatra. Pale-carmine; an immense flower.
Comtesse de Nadaillac. Bright-flesh, shaded apricot.
Madame Bravy. Creamy-white, often called Mme. de Sertot, Alba Rosea, and Josephine Malton.
President. Salmon-rose, large.
Souvenir d'Elise Vardon. Cream-white, large, well-formed.
Sunrise. Outside carmine-rose, free, extra sweet.
Sunset. Deep-apricot.

Medium growers, 3 to 4 feet:—

Amazone. Lemon-yellow, beautiful in bud.
Anna Ollivier. Rosy-flesh and buff, variable.
Bridesmaid. A rose-coloured sport from the next.
Catherine Mermet. Light-flesh, exquisite in form.
Devoniensis. Creamy-white.
Dr. Grill. Coppery-yellow and rose.
Elise Fugier. Pale-lemon.
Ernest Metz. Carmine-rose, large size.
Ethel Brownlow. Salmon-pink and yellow, rather tender.
Etoile de Lyon. Sulphur-yellow; opens best under glass.
Francisca Kruger. Coppery-yellow and peach.
G. Nabonnaud. Soft-rose, almost a saffron-yellow centre and light edges.

Innocente Pirola. Cream, sometimes tinted with pink.
Isabella Sprunt. Canary-yellow; best in bud.
Jean Ducher. Yellow, shaded salmon; does well under glass.

La Boule d'Or. Golden-yellow, very double.
Luciole. Carmine and yellow.
Madame Cusin. Rose and yellowish-white, small.
Madame de Watteville. Salmon-white, bordered rose.
Madame Falcot. Apricot-yellow, beautiful in bud.
Madame Hoste. A pale-yellow sport from Anna Ollivier.
Madame Lambard. Rose and salmon, variable.
Maman Cochet. Carmine and yellow.
Marie Van Houtte. Creamy-yellow, edged carmine.
Niphetos. The best white for pots.
Perle des Jardins. Straw-yellow, handsome foliage.
Rubens. White, tinted rose, early.
Safrano. Apricot, good in the bud.
Souvenir de S. A. Prince. A pure-white sport of the preceding.

Souvenir de Thérèse Levet. Dark-shaded red.
Souvenir d'un Ami. Salmon and rose, sweet-scented.
The Bride. A white sport from Catherine Mermet.

Vigorous growers, 5 feet or more. Useful as climbers under glass or against walls in the open.

Belle Lyonnaise. Pale canary-yellow.
Climbing Devoniensis. Creamy-white; free, tender.
Climbing Niphetos. Pure-white; shoots 10 to 20 feet.
Climbing Perle des Jardins. Straw-yellow, vigorous.
Germaine Trochon. Fawn and yellow, very vigorous.
Gloire de Dijon. Buff, pale-orange centre.
Madame Bérard. Buff and apricot, strong grower.
Madame Chauvry. A yellow form of the preceding.

HYBRID NOISETTES.—This small class includes a few exceedingly valuable varieties, such as:—

Baronne de Maynard. Pure-white.
Boule de Nègre. White, very hardy, a good grower.
Coquette des Blanches. Pure-white, small.

Madame Alfred Carrière. White, yellow base, free.
Reine Olga de Wurtemberg. Light-crimson, a grand climber, handsome foliage.

HYBRID TEAS.—This comparatively new class has been produced by crossing Teas with Hybrid Perpetuals. They were at first relegated to the class they most nearly approached, but they soon proved distinct enough to form a new class. The late Mr. H. Bennett of Shepperton raised some of the earliest and best. The class is now increasing rapidly, and has many good qualities. They are equally free and continuous bloomers with the Teas and Chinas, and they are almost proof against orange-fungus and red-rust.

Augustine Guinoisseau. A blush-white La France.
Bardou Job. Large, crimson, semi-double.
Camoens. Bright-rose, yellow base, compact habit.
Captain Christy. Clear-flesh, dark centre; there is an extra strong climbing variety of this.
Caroline Testout. Salmon-pink, fine and free.
Cheshunt Hybrid. Cherry-carmine; a robust climber.
Clara Watson. Salmon and pink.
Duchess of Albany. A dark form of La France.
Gloire Lyonnaise. Pale lemon-white; excellent for beds.
Grace Darling. Large, full, rich-pink, dark centre.
Gustave Regis. Canary-yellow, extra long buds.
Kaiserin Augusta Victoria. Cream, shaded lemon.
Lady Mary Fitzwilliam. Rosy-pink, dwarf and compact.
La Fraicheur. White, tinted with rose.
La France. Silvery-peach.

Madame Abel Chatenay. Pale-fawn, pink and salmon.
Madame Pernet Ducher. Canary-yellow, good in bud.
Marjorie. White, flushed pink; a compact grower.
Marquise Litta. Rosy-carmine.
Marquis of Salisbury. Bright-red, semi-double, extra free and good.

Mrs. W. J. Grant. Bright rosy-pink, very free; good in beds or pots.

Reine Marie Henriette. Carmine; an immense grower, hardy, and especially bright under glass during winter.

Viscountess Folkestone. Silvery-white, tinted with pale-salmon, very large, sweet and free.

Varieties for pot-culture.—Augustine Guinoisseau, Captain Christy, Caroline Testout, Clara Watson, Clio, Fisher Holmes, General Jacqueminot, Gustave Piganeau, Heinrich Schultheis, Lady Alice, Lady M. Fitzwilliam, Madame Lacharme, Marquise Litta, Merveille de Lyon, Anna Ollivier, Catherine Mermet, The Bride, Niphetos, G. Nabonnaud, Francisca Kruger, Hon. E. Gifford, Jean Ducher, Mme. de Watteville, Maman Cochet, Souvenir d'un Ami, Sunrise, Duke of York; all the Fairy and Miniature Mosses.

Varieties for massing in beds.—Augustine Guinoisseau, Baroness Rothschild, Caroline Testout, Danmark, Duke of Wellington, General Jacqueminot, J. D. Pawle, La France, Marquise de Salisbury, Merveille de Lyon, Triomphe de Caen, Viscountess Folkestone, Prince C. de Rohan, Queen of Bedders, Souvenir de la Malmaison, Comtesse de Frigneuse, Dr. Grill, Edith Gifford, Madame de Tartas, Mme. Hoste, Marie van Houtte, Duke of York, Cramoisie Superieure, Mrs. Bosanquet, Caroline Kuster; the Provençes, and Scotch Briers.

Varieties for beds, the shoots to be pegged down.—Abel Carrière, Baron de Bonstetten, Charles Lefebvre, Duke of Edinburgh, Earl of Dufferin, Gloire de Dijon, Her Majesty, Madame A. Carrière, Mme. G. Luizet, Mme. Montet, Ulrich Brunner, Mrs. Paul, Madame Bérard, William A. Richardson, and L'Idéal.

Varieties for training on pillars.—Duke of Edinburgh, Paul Neron, Dupuy Jamain, Earl of Dufferin, Jeannie Dickson, Mme. Isaac Pereire, Margaret Dickson, Mrs. J. Laing, Caroline Kuster, Mrs. Paul, Coupe d'Hébé, Fulgens, Boule de Neige, Coquette des Blanches, Gloire de Rosomanes, Princess Louise Victoria, Bardou Job, Waltham Climber No. 3, Madame A. Chaténay, Polyanthas simplex and grandiflora.

Varieties for high walls and fences.—The climbing forms of *Devoniensis, *Perle des Jardins, *Niphetos and Captain Christy; Mme. Bérard, the White and Yellow Banksians, *Reine M. Henriette, Belle Lyonnaise, Céline Forestier, L'Idéal, Ophir, Rêve d'Or, *William A. Richardson, *Maréchal Niel, *Mme. A. Carrière, Reine Olga de Wurtemberg, Rosa Bracteata, Tour Bertrand, and *Gloire de Dijon.

Varieties for screens and arches.—Dundee Rambler, Rosa setigera, R. moschata, R. macrantha, The Garland, Longworth Rambler, Crimson Rambler, Rêve d'Or, Emilie Dupuy, Setina, Félicité Perpétué, Leopoldine d'Orleans, Splendens, Ruga, and the newer forms of Sweet Briers.

[A. P.]

* The asterisk denotes those suited for walls, &c., under glass.

Sarracenia.—The Side-saddle Flowers or North American Pitcher-plants are worth a place among popular garden plants. They are easy to cultivate in a greenhouse, and they are

of exceptional interest, both in the structure and functions of their trumpet-like leaves, and in the large size and singular form of their flowers. There are six species, all North American, and from these numerous hybrids have been raised. In the warmer parts of England some of them may be grown in a sheltered, moist, sunny situation out of doors, but the best results are obtained when the plants are grown under glass. *Sarracenias* are essentially swamp or marsh plants. They like an open, porous compost, free of lime, and plenty of water all through the spring and summer; in fact they should never be allowed to get dry. They grow well and flower freely under the following treatment:—The plants are wintered in a cold house or frame, a few degrees of frost doing them no harm. In March they show signs of active growth by pushing up flower-buds, and as soon as these appear, the plants should be repotted. This should be done thoroughly, by shaking the roots free of all old soil, cutting away the decayed and useless old parts of the rhizomes, removing all old leaves, and planting them in well-drained pots or pans in a mixture of fibrous peat, sphagnum, charcoal and silver sand, setting them rather close together if a good specimen plant is desired. They should then be placed in a sunny position in a greenhouse where they can be kept close in sunny weather. The secret of success is simply to allow the temperature about the plants to run up to 80° or even 90° with sun-heat, keeping the soil saturated and the atmosphere moist; the temperature may fall quite low during the night without fear of injury. The best plants have been grown in a house where artificial heat was never used, but where the sun sometimes raised the temperature to 90°. Bright light, a high temperature, and plenty of moisture are the chief factors in the production of large, richly-marked pitchers.

The flowers precede the new leaves, and sometimes the plants are weakened by over floriferousness; each rhizome should therefore be limited to one flower. After the pitchers have matured, by the end of June say, the temperature and conditions of an ordinary greenhouse are suitable, plus plenty of water at the roots; a heavy watering every day, sometimes oftener, will be found agreeable to them.

S. Chelsoni (*purpurea* × *rubra*).—Pitchers 1 foot long, broad, as in *S. purpurea*, almost erect, and coloured a rich claret-purple. Flowers 4 inches across; purplish-brown.

S. Courti (*purpurea* × *psittacina*).—Pitchers 8 inches long, coloured deep-crimson.

S. Drummondii has erect trumpet-shaped pitchers 2 feet or more long, the lid broad and wavy, the upper part white with reddish and green veins; flowers 4 inches in diameter, maroon-coloured, the stigma greenish-red; one of the most beautiful.

S. flava (fig. 628).—Pitchers up to 3 feet in length, erect, green, the veins red, the upright lid yellowish;



Fig. 628.—*Sarracenia flava*.

flowers large, canary-yellow. The varieties, *ornata* and *atrosanguinea*, are improvements on the type, the former being very large and wide-mouthed in the pitcher; *atrosanguinea* is remarkable for the deep red of its veins and lid.

S. formosa (*psittacina* × *variolaris*).—Pitchers 6 inches high and coloured green, with reddish spots and veins.

S. melanorhoda (*purpurea* × *Stevensi*).—Pitchers 6 inches long with a deep wing; colour rich blood-red.

S. Patersoni (*purpurea* × *flava*).—There is little difference between this and *S. Stevensi*.

S. Popei (*flava* × *rubra*).—Remarkable because of its flowers, which are 4 inches across, and coloured rich velvety crimson, with yellow margins, and pink inside the petals.

S. psittacina.—A small plant with horizontal pitchers, with a broad wing, a hood-like lid, and the apex twisted like a parrot's head.

S. purpurea has short horn-shaped, inflated pitchers of a deep blood-colour, the flap-like lid upright. A plant in a 10-inch pot may have thirty large crimson pitchers.

S. rubra.—Pitchers erect, 2 feet high, with a pointed,

inflexed lid; green with red veins on the upper part; flowers 3 inches across, red-brown.

S. Stevensi (*purpurea* × *flava*).—One of the finest pitchers, 2 feet long, erect; green, with a reticulation of brown-red. Flowers 6 inches across, the sepals green, the petals crimson outside, cream-coloured within, and the style, which is 3 inches across, bright-green.

S. variolaris has pitchers 1 foot high, with a broad wing and a hood-like lid; they are green with a little yellow mottling about the mouth. The flowers are large and pale-primrose coloured.

S. Williamsi (*purpurea* × *flava*).—Pitchers shorter than in *S. Stevensi*; flowers are 5 inches across and coloured red-brown on the sepals, rosy-lilac on the long petals, the large disc of the style being green.

Other good hybrids with characters partaking more or less of both parents are:—*S. Swaniana* (*purpurea* × *variolaris*), *S. Wrigleyana* (*psittacina* × *Drummondii*), *S. Tolliana* and *S. Wilsoniana* (*purpurea* × *flava*); *S. Mitchelliana* (*Drummondii* × *purpurea*), *S. excellens* (*Drummondii* × *variolaris*), *S. Maddisoniana*, *S. Mooreana* (*Drummondii* × *flava*).

Streptocarpus.—A race of useful greenhouse plants, a comparatively recent addition to our gardens. It is of hybrid origin, the introduction of *S. Dunnii* from the Transvaal to Kew in 1886 having led to various crosses which have had most valuable results, the plants being easy to cultivate, of varied and pleasing floral attractions, and useful in several ways. *S. Dunnii* has only one large leaf, sometimes a yard long and half a yard wide, from the base of which the flowers are produced on crowded erect panicles, quite a sheaf of them; each flower being 1½ inch long and brick-red in colour. It was crossed with *S. Rexii*, which has numerous small leaves and slender scapes of one or two bluish flowers, the result being the hybrid named *S. Kewensis*. It was also crossed with *S. parviflorus*, a white-flowered species of similar habit to *S. Rexii*, and these two yielded *S. Watsoni*. These were again crossed with each other and with their parents, the result being a most interesting and promising brood. Their flowers varied in colour from white to crimson and deep-blue. A selection of them passed into the hands of Messrs. J. Veitch & Sons, who have since continued to cross and improve them with most gratifying results. They have also crossed the Kew race with various other species, and obtained several distinct breaks, i.e. with *S. polyanthus*—result, the race known as *achimeniflorus* (fig. 629); with *S. Fanninii*—result, the race known as *pulchellus*. *S. Wendlandii* has also been used as a breeder.

It is remarkable that the colours of most of the seedlings, all perhaps except red, come true from seeds. With regard to red, the colour

obtained from *S. Dunnii*, the seedlings show a tendency to lose that colour, and it is probable that to maintain it among the garden races of the genus, *S. Dunnii* must be frequently used as a breeder.

The cultivation of Streptocarpaceae presents no difficulties. They may be grown as stove plants along with Gloxinias, or in a frame or greenhouse with Pelargoniums and tuberous Begonias. Although they are perennials, the best results are obtained when they are treated as



Fig. 629.—*Streptocarpus achimeniflorus*.

annuals, or at most as biennials, raising a fresh stock annually from seeds sown in heat in February. They may be treated exactly as recommended for Gloxinias, or, if to be grown in a greenhouse or frame, the same course may be followed as is known to succeed in the case of tuberous Begonias. It may not be generally known that these plants are admirably adapted for planting in beds or rockeries under glass, and that they thrive in shaded positions where many plants would fail for want of light. From seeds sown in February good plants, well flowered, are possible by the following August, and these will flower freely and continuously all through the autumn and winter. Exceptionally good varieties may be perpetuated by means of leaf-cuttings planted in cocoanut fibre in a propagating frame, but as a rule plenty of seeds are ripened on the plants. Any ordinary garden soil may be used for them. If grown in pots, a 5-inch is sufficient for each plant, but nice specimens can be made by plant-

ing four or six plants in a 8- or 10-inch pot or pan.

The worst insect pest is the Begonia mite, which is difficult to exterminate if once it gets established on the leaves. Frequent applications of soft-soap, tobacco-water, and sulphur are the best remedy. Bug also attacks them, usually on the under side of the leaves; it must be watched for, and the usual remedy applied.

Tritonia (*Montbretia*) (fig. 630).—Among the many beautiful bright-flowered genera of bulbous plants inhabiting the veldts and rocky ridges of South Africa *Tritonia* is conspicuous.



Fig. 630.—*Tritonias*.

Several species are in cultivation, and from these have originated, principally through the efforts of M. Lemoine of Nancy, a race of hybrids, which for brilliant colouring and free-flowering propensities ranks high among the best subjects of the bulb garden. They are not very fastidious in their requirements. Given a sunny position, a good, well-drained light soil, plenty of water, and occasional applications of weak liquid manure while growth is active, and a decided rest of several months' duration after the leaves are dead, success should be certain.

In the south-west counties, or wherever severe frosts are not experienced, *Tritonias* may be successfully grown in a bed or border all the year round. In less favoured places they require to be cultivated in a sunny greenhouse or frame, or in a south border close to the wall of a warm house. Grown in the open, they should be planted in late autumn or early spring, 3 inches below the surface, a little sand being placed beneath each bulb. In early summer, when growth is active, a surface dressing of rotten manure is advisable. The flowering period is from July onwards for three months. For indoor culture, seven or eight bulbs may be placed in a 6-inch pot, in rich soil, and grown on during winter to flower in early spring.

After the flowers are over, the plants must still be given a light, sunny position, with plenty of water until the leaves begin to turn yellow, when it must be withheld. The following are useful species and varieties:—

T. crocosmaeflora.—A handsome hybrid between *T. Pottsi* and *Crocosmia aurea*. It is very vigorous, and produces orange-red flowers in quantity. Good varieties of it are *Bouquet Parfait*, *Etoile de Feu*, *Gerbe d'Or*, *Lustre*, *Transcendant*.

T. flava.—Flowers yellow, 1 inch long, in large branched racemes on scapes $1\frac{1}{2}$ to 2 feet high.

T. lineata.—Flowers pale-yellow, stem 18 inches.

T. Pottsi.—Gladolus-like in habit, flowers bright-yellow, red outside, tubular, 1 inch long, in branched spikes 9 inches or more long surmounting stem $2\frac{1}{2}$ feet high.

Tulip.—Of this showy genus there are seventy or more species distributed in Europe, North Africa, western and central Asia as far east as Japan. The Tulip was introduced from Turkey, by Busbecq, to Vienna, and thence to Holland, about the year 1560, where their beauty and variety of colouring soon created much emulation, and their popularity culminated in the historical craze, the Tulipomania, a stock-exchange bubble; 2000 to 5000 florins being exchanged for a single root, or even for its reputation and name only.

In 1597 they had become so very popular in England, that Gerard said his friend, Mr. James Garrett, an apothecary, had by the diligent sowing of seeds for twenty years, obtained such variety that he, Gerard, only describes less than a score, referring the rest to "some that mean to write of Tulipa a particular volume".

Gerard thus early divided Tulips into early, medium, and late flowering kinds, a distinction which holds good to-day.

The early, or bedding Tulips, are believed to have originated from *T. suaveolens* (South

Russian), while the late, or May-flowering kinds, are the offspring of *T. Gesneriana* (fig. 631), from the Levant (1577). All the florists' Tulips are seedling variations of the last-named species, probably one of the first Tulips introduced to European gardens.

All Tulips are beautiful, but self-coloured kinds are most effective in the open air, and what we want are plenty of strong and stately seedlings of *T. Gesneriana*, of all shades of colour, especially good self- or single - coloured kinds.

Now that all sorts of Tulips are being largely grown in English and Irish gardens for sale, I hope that seedlings may also be reared every year, and the best selected for stock.

The Parrot Tulips form a distinct and showy class, their chief drawback being their weak stems, their flowers being soiled by being too close to the ground.

Cultivation.—Tulips, especially hybrids and seedlings, are easily grown, a deep, rich soil suiting them best. In Holland they prefer a stronger and more loamy soil than the Hyacinth, but at Rush, near Dublin, they grow very vigorously in the deep moist sand near the sea-shore. As a rule they are not exacting, and thrive well in any good loamy soils, living for years undisturbed in cottage and farmhouse gardens nearly everywhere. Still it is as well to lift the bulbs when their leaves turn yellow, say in June, every two or three years, or the clumps become crowded and flower poorly. The bulbs may be dried and cleaned in an open, airy shed, and then stored in open-work boxes or shelves, until planting-time, which may vary from August until November, the sooner the better, especially on cold and wet soils. The bulbs may be selected into firsts and seconds, for blooming, and spawn for stock.

A canvas shade or awning is necessary over all Show Tulips when they bloom in spring.



Fig. 631.—*Tulipa Gesneriana*, var. Keizerkroon.

SPECIES OF TULIPA.

T. acuminata.—Curious, with long thin petals, not showy. Syn. *T. cornuta*.

T. Albertii.—Dwarf, with undulate, prostrate leaves. Flowers red, with a blotch of yellow edged with black on each petal. Turkestan.

T. altaica.—Yellow or red. Segments oblong acute. No basal blotch. 6–12 inches high. Central Asia.

T. aucheriana.—Mauve or lilac. Stamens hairy at the base, 4–8 inches high. Persia.

T. australis.—Known from *T. sylvestris* by its funnel-shaped perianth, yellow flushed red on the outside, and its more slender habit. Savoy. Syns. *T. Breyniana* and *T. Celsiana*.

T. humilis is a dwarf species from Persia, closely allied to the last.

T. Batalini.—Dwarf and exquisite species, with pale-yellow, fawn, or apricot-hued flowers. Leaves narrow, undulate, prostrate.

T. Biebersteiniana.—Near *T. sylvestris*, but smaller and more gracile. Siberia and Asia Minor.

T. biflora.—A very old kind, bearing two or more flowers on branching scapes. Flowers creamy-white, with a yellow eye. Caucasus.

T. Borszczowi.—Bright-red, with a brownish-black basal blotch, margined with yellow. Central Asia. It is dwarfer than *T. Gesneriana*, and there is a yellow form without any basal blotch.

T. brachystemon.—Near *T. Kesselringii*, than which it has smaller flowers, segments more acute, leaves narrower and only two in number. Turkestan.

T. Clusiana (Lady Tulip) (fig. 632).—An elegant variable species. Flowers white, striped red, with a purplish centre. Mediterranean region; introduced in 1636, and so one of our oldest Tulips. *T. stellata* is a near ally. Himalayas.

T. Didieri.—Deep-red, with black blotch, edged yellow or white. There are also yellow and white forms. Alps.

T. elegans.—Bright-red, with yellow base. Perhaps a hybrid of *T. suaveolens* × *T. acuminata*.

T. Gesneriana.—One of the best and most variable of all Tulips. Type crimson-red, with a blue base. Grows 2–3 feet high. *T. fulgens* is of a more intense colour, yellow at base, with pointed segments.

T. Greigi.—Vivid orange-scarlet flowers of great size. Leaves blotched with purple. Very variable and showy. Turkestan.

T. Kaufmanniana.—Bright-yellow; no basal blotch. Large and showy. Central Asia.

T. Macrospila.—Erect habit, about 16 inches high. Leaves erect, blue-green. Flowers vivid, crimson-red, with blackish basal spot edged with yellow. One of the best garden Tulips. Supposed hybrid.

T. oculus solis (Sun-eye Tulip).—Apricot-red, with dark blotch. Very showy. South France.

T. persica (Persian Tulip).—A dwarf and late-flowering kind, with coppery buds and bright-yellow flowers, often two to three on a stem. A pretty little species, not showy. Persia.

T. platystigma.—This is a rosy-coloured kind with a dash of orange through it, and is supposed to be the parent of the so-called Dragon or Parrot Tulips, which revert to this kind when allowed to remain long in the same place. Wild at Guillestre, in the High Alps.

T. præcox.—More robust and taller than *T. oculus solis*, also earlier flowering. Italy.

T. retroflexa (fig. 633).—Primrose-yellow; three segments reflexed with age. Supposed hybrid between *T. Gesneriana* and *T. acuminata*. A dainty garden variety.

T. suaveolens (Van Thol Tulip).—Sweet and early-flowering. Flowers red and yellow, on downy peduncles.



Fig. 632.—*Tulipa Clusiana*.

South Europe, 1603. This is the parent of the early-flowering Dutch Tulips.

T. sylvestris (Wild Tulip).—Flowers yellow, filaments hairy at the base. Very sweet-scented; hence the synonym of *T. fragrans*. Very pretty, and early in the grass. Britain and Europe.

T. triphylla.—Bright lemon-yellow, greenish outside. Flowers in March. Central Asia.

T. Turkestanica.—Near *T. biflora*. Flowers yellow, often three to four on a stalk. Early and showy. Turkestan.

BEST GARDEN TULIPS.

Single Early-flowering or Dutch Tulips.—Artus (scarlet), Belle Alliance (scarlet), Bride of Haarlem (white and yellow striped vars.), Brutus (carmine), Canary-bird (yellow), Cottage Maid (rose and white), Colour Cardinal (crimson-red), Crimson King, Duc van Thol (red and yellow)—of this there are scarlet, rose, red, yellow, striped, white, violet, and other variations, Duchess de Parma (orange-red and yellow), Keizerkroon (red, bordered with yellow), Joost van Vondel (red and white, also pure white), La Reine (rose-white), L'Immacule (white), Mon Tresor (yellow), Ophir d'Or (gold), Pattehakker (white, yellow, and scarlet vars.), Prince of Austria (orange-red), Proserpine (carmine-rose), Queen Victoria (white), Rembrandt (scarlet), Rose Gris de Lin (white and rose), Thomas Moore (brown-red), Verboom (scarlet), Vermilion Brilliant, White Swan, Wouwerman (violet-red), Yellow Prince.

Double-flowered Dutch or Early Tulips.—Blanche Native (white), Couronne d'Or (yellow), Couronne des Roses (rose and white), Duc van Thol (red and yellow, scarlet, and violet vars.), Duke of York (carmine and white), Fluweelen Mantel (Velvet Gem) (dark carmine),

Gloria Solis (brown, yellow-bordered), Imperator Rubrum (scarlet), La Candeur (white), Murillo (blush), Queen Victoria (carmine), Rex Rubrorum (scarlet), Salvator Rosa (dark rose), Tournsol (red and yellow forms), William III. (orange-scarlet), new.

Double-flowered Dutch or Late Doubles.—Blue Flag (violet), Belle Alliance (violet-red and white-striped), Mariage de ma Fille (crimson and white), Paeony Gold (red, or red and gold striped), Yellow Rose (yellow).

Parrot or Dragon Tulips.—Admiral of Constantinople (red), Lutea Major (yellow), Perfecta (scarlet and yellow), Cramoisie Brilliant (crimson), Coffee Colour, Fire King (brown), Crimson Beauty (blood-crimson), Large Yellow, Perfecta (golden-yellow).

Darwin or Self Tulips.—Apricot (large coppery-buff), Bronze King (golden-bronze), Coquette (soft-rose), Dorothy (soft rose and white), Flambeau (scarlet-red), Glow (vermilion), Gipsy Queen (dark-maroon), Hecla (deep-maroon), Joseph Chamberlain (cherry rose-scarlet), Loveliness (bright satiny-rose), May Queen (soft-rose), Salmon King (salmon-rose), The Shah (dark cherry-rose), The Sultan (nearly black), Herschell (dark-maroon), White Queen (rose in bud, opening creamy-white).

The Darwin Tulips are lacking in yellow colours, but Mrs. Moon, Bouton d'Or, Parisian Yellow, or Gold Crown may be planted with them to supply this want of brightness.

The Florists' or English Tulips (fig. 634).—Some people still grow and admire these, so that a few words concerning them may be necessary. As raised from seed they first bloom as "breeders" or self-coloured flowers, and are in that state often very beautiful, but they may at any time become "broken" or "rectified", which means



Fig. 633.—*Tulipa retroflexa*.

that they produce striped or variegated flowers. All Florists' Tulips must have a pure and clean white or yellow circular base to the flower on which the dark anthers show up conspicuously. The old growers planted each bulb separately, in

beds 12 inches apart, four or five in a row across the bed, and when they bloomed, or before, a light canvas awning protected them from wind,



Fig. 634.—English Tulips.

hail, or rain. The bulbs were lifted every year and stored in pigeon-holed boxes or drawers, each known under a separate number, the numbers and corresponding names being kept in a book for the purpose.

Messrs. Barr and Son of London still keep up a small and select named collection for sale.

The Florists' Tulips are divided into four groups, viz.: Selfs or breeders, Bizarres, Byblœmens, and Roses. In Bizarres the colours are red, chestnut, or maroon, on a yellow base or ground colour. The Byblœmens are various shades of purple, shading to almost black, on a white ground colour; and in the Roses the colours are rose, deep-red, or scarlet, the base again being white.

A feathered Tulip has the colour finely pencilled around the margins of the petals and sepals. In a flamed variety the streaks or flames of colour extend from the margin towards the base of the flower.

Vallota purpurea (fig. 635), the Scarborough Lily, a native of South Africa, is not unlike a Hippeastrum in bulb and leaves, and has bright-

red flowers, 3 inches across, in umbels of from three to seven on stout scapes 18 inches high. The bulbs should be potted firmly in a mixture of good fibrous loam, leaf-soil, and sand in well-drained pots, and grown in a greenhouse or sunny frame. After they are established they should not be disturbed at the root for several years, the plant, both growth and flowers, being better if the pot is well filled with roots. Offsets are produced freely by established bulbs, and these are the best means of increasing the stock. They should be pricked off in pans in which they can remain for two years, afterwards removing them to pots, several bulbs being placed in each. A rest should be given in winter by keeping the soil on the dry side, but they should never be dried off. After growth commences in March, liquid manure should be given frequently until the flowers appear, which occurs usually in August. There are several named varieties, viz.: *magnifica*, with flowers larger and brighter coloured than the type; *major*, with large deeper-coloured flowers; *eximea*, remarkable in having flowers of a magenta shade with a conspicuous white eye; and *carnea*, with rosy-red flowers. A hybrid between *V. purpurea* and *Cyrtanthus sanguineus*



Fig. 635.—*Vallota purpurea*.

has been raised in gardens, and is known as *Cyrtanthus hybridus*.

Viola (*Viola tricolor*).—Under this heading is included the Show and Fancy Pansies, and

also the smaller-flowered free-blooming bedding Violas, or Tufted Pansies, now so much employed for garden decoration. It is only in special cases that varieties of Pansies and Violas are named and propagated by division or by cuttings, but they are very largely treated as annuals, and a supply maintained by successive sowings.

The Show Pansy, so long cultivated by florists for exhibition purposes, is divided into three sections, viz.: *Yellow-grounds*, having a dense dark blotch round the eye, encircled by an irregular zone of yellow, and then a margin of belting of some shade of bronze, crimson, purple, or maroon; *White-grounds*, having a white ground, with more purple or violet in the marginal markings; and *Sels*, which may be white, cream, primrose, yellow, or black. Show Pansies are but little grown in the south; the summers are too hot and dry for them; but they flourish in the north, and especially in Scotland, where they are largely grown, and where most of the new varieties are raised.

The introduction of the Belgian Pansy about forty years ago resulted in the production of what is now known as the Fancy Pansy (fig. 636), characterized by large flowers, heavy blotches, and brilliant and striking colours. The plants are more robust than the show varieties, and support heat and drought much better. They do well in a deep gritty soil, enriched with plenty of leaf-mould. Seedlings come fairly true to character, and maintain a high quality of bloom, but the higher the quality the less seed do they produce.

Named varieties of Pansies are propagated by cuttings of the young shoots put in in early summer in a bed of sandy soil under the shade of a wall or hedge, and covered with a hand-light or small frame. When rooted, they may be planted in nursery beds; they flower in the following spring and summer. If the plants, after they have flowered, are top-dressed with an inch or so of fine potting soil, the young growths root into it, and the plants may be divided in autumn.

Seeds sown as soon as they can be obtained give plants which bloom in late autumn and again in spring. Sown in August and September, the plants thus raised bloom in May, June, and July. A sowing made in March gives a succession of plants to flower in early autumn. They may be sown in a prepared bed, or in a box of light sandy soil in a cold frame, shading when necessary. When large enough to handle,

the seedlings should be pricked off into other boxes or beds in a frame, where they may remain till March, when they may be planted either in borders or prepared beds. They do best in soil which has been enriched during the autumn with manure—cow or short horse-manure. By preventing seeding—that is, by picking off all flowers as they begin to decay—a long succession of bloom will be kept up. If the plants get affected with green or brown fly, two or three syringings with a solution of



Fig. 636.—Fancy Pansy.

soft-soap (2 ounces to the gallon) will kill them. A top-dressing of sifted old manure or leaf-soil during May or early June is a capital stimulant, and works wonders in sustaining summer bloom.

A selection of the best sorts:—

Agnes Mabel, A. H. Murray, Alex. Smith, David Rennie, D. Morrison, Edith T. Crossley, Geo. Anderson, James Campbell, Jas. M'Farlane, Jessie Ford, Jessie Russell, John Freeman, Lord Hamilton, Maggie A. Scott, Maggie M'Phail, Maggie Watson, Mrs. D. Johnstone, Mrs. M. Cuthbertson, Mrs. Spence, Mrs. Wm. Brownlie, Mrs. Wm. Watson, Pilrig, R. Jamieson, Tom Travis.

The Bedding Viola or Tufted Pansy (fig. 637) is a development of the past half-century, and forms a race of compact-growing, small-flowered, free-blooming Pansies, longer-lived than the large-flowered race, and better able to support hot dry seasons. They are therefore much used for flower-gardening during summer. It is to

be feared that too much attention has been paid by raisers of new varieties to the production of flowers for exhibition without regard to the habit of the plants and their usefulness in the garden. A low-growing, spreading, and tufted habit is most desirable. Propagation by cuttings, division, and seeds.

The following selection of sorts is taken from the Report on the trial of *Violas* made at Chis-



Fig. 637.—*Violas*.

wick in 1898, when a collection of 174 varieties was got together, and grown on a west and north border.

Yellow.—A. J. Rowberry, Ardwell Gem, Bullion, Lord Elcho, Princess Louise, Princess of Wales.

White.—Christiania, Countess of Hopetoun, Marchioness, Pencaitland, Sylvia, Vestal.

Mauve and Lilac.—Bridegroom, Diana, Duchess of Sutherland, Gipsy Queen.

Light and Dark Blue.—Blue Bell, Blue King, Holyrood, Iona, Mrs. Gordon, Sir R. Pullar.

Purple.—Crown Jewel, Hamish, Mrs. Bellamy, The Mearns.

Other colours.—J. B. Riding (purplish-rose), William Niel (rosy-lilac), Bronze Queen (brown and purple), Wrayment (cream-white and blue).

[R. D.]

Violet (*Viola odorata*).—Violets are universal favourites. They can be grown in almost any soil and situation, but in order to produce special results, good soil and good cultivation

are necessary. With proper treatment and a good selection of varieties, flowers may be had in profusion during the autumn, winter, and spring months. Although easily managed in some gardens, in others they are often unsatisfactory, although treated in an exactly similar manner. It is therefore necessary for every grower to find out by experiment what particular treatment as to position and soil will be most successful. It has been found that in a light sandy soil, on a border facing north, Violets generally have done well. In a deep loamy soil on a west or east border they have also done well; and on stony loam, inclined to clay, a south border has suited them. Success depends, however, not so much on soil or aspect as the proper kind of treatment. To obtain large fine blooms in winter it is indispensable to begin with young healthy plants every year. Old plants will never produce first-rate blooms, no matter how well they are cultivated.

Cultivation in Frames.—Where space is limited, frame cultivation is perhaps the most satisfactory, for although the Violet is perfectly hardy, heated frames will be found of great value during the damp and often frosty days of winter, and will do much towards ensuring a constant supply of flowers. Early in spring cuttings formed of the small side-shoots from the flowering crowns should be planted in a frame or hand-light in a mixture of loam, leaf-mould and sand, keeping them close until they are well rooted, when air should be given freely, leaving the lights off altogether in mild weather. When rooted they can be left in the frames until July.

During summer, the plants require to be freely watered, and the side-shoots removed to secure fine plump crowns. Frames that have been used for early vegetables are useful for planting out Violets to flower in autumn and winter. Plant in light rich soil, near the glass, airing freely, except when there is frost. Keep the plants clean, stir the soil frequently, and give little water during the winter. In spring, the plants may be lifted and divided into as many as possible, and if replanted they ought to make large plants by the autumn.

The character of the season has a great deal to do with the success of Violets. Those planted on a south border will always do best in a damp season, and those on a west or north border when the conditions are hot and dry. Should red spider at any time appear, dust the plants over with hot lime and soot, and repeat the operation until the plants are free from this

pest. For cultivation in pots, young plants should be potted singly in 60's, or four plants in 32's. Violets may be advantageously grown in the open on raised beds, shaped in the form of a steep ridge, and planted on both sides. They are sometimes attacked by a fungoid disease which causes dry, whitish spots on the leaves, often proving troublesome when the plants are grown under glass. Mr. Massee recommends spraying with dilute Bordeaux mixture as a cure. Badly infested plants should be burnt. Cuttings should be taken only from perfectly healthy plants.

SELECT VARIETIES.

Double.

Marie Louise. Excellent for autumn and winter blooming. Large, rich lavender-blue.

Lady Hume Campbell. Later, and a shade darker than *Marie Louise*.

Neapolitan. Lavender, with white eye. One of the best and largest; later, and not so free as either of the above.

De Parme, pale violet; early, very free.

Swanley White. A grand companion to *Marie Louise*; very free.

Single.

Wellsiana. Perhaps the finest single; dark, very large.

Victoria Regina. Fine flowers with long stalks.

The Czar. Very dark and free.

Princess of Wales. Very large, free; bright in colour.

Double Russian. Invaluable for its extreme lateness.

La France. Very large, stiff-stalked; bright blue-purple.

[J. S.]

CHAPTER XXVIII.

GREENHOUSE AND CONSERVATORY.

I. THE GREENHOUSE.

A greenhouse is a glass-roofed structure devoted to the cultivation of plants that require protection from extremes of weather. In England the term is limited by gardeners to houses in which the temperature is regulated by means of ventilators and shading, except in cold weather, when artificial heat is employed to keep up a temperature a few degrees above freezing-point. The plants usually grown in such a house are known as greenhouse plants, as distinguished from stove plants, &c. A popular classification of indoor plants, according with their grouping for convenience of cultivation, is:—(1) Stove Plants, (2) Greenhouse Plants, (3) Stove Ferns, (4) Greenhouse Ferns, (5) Stove Orchids, (6) Greenhouse or Cool Orchids. Using the term Greenhouse as here defined, it is limited to a

structure devoted to such plants as Pelargoniums, Fuchsias, Camellias, Cape Heaths, Bouvardias, Boronias, &c. As a rule they are plants that thrive only when provided with all the light possible, except when there is danger of sun-scorching.

The necessity of light to vegetable life is better understood at the present day than in times past, particularly as regards the plants we grow under glass, and more especially such as require greenhouse treatment, which in most cases are indigenous to countries where the light is much in excess of that which our climate affords, even in the open air. There is undoubtedly in plants a certain ability to adapt themselves to circumstances of situation very different from those under which the individual species or variety existed in a state of nature; otherwise, the majority of the plants we cultivate under glass would fail. Yet there are some elements so indispensable to the existence of many of them, that even after a lengthy period of existence under artificial treatment, during which they have been inured to altered conditions, they are still as unable to dispense with them as they were the day they left their native country. Amongst these light is of the first importance. A plant that in its native habitat is fully exposed to unobstructed light cannot as a rule be grown artificially unless allowed plenty of light by the cultivator.

Span-roofed greenhouses are by far the best for general purposes. Their height must be in a measure determined by their width. In houses devoted to the growth of greenhouse plants there is little internal moisture, consequently there is not likely to be much drip through condensation of vapour upon the glass and sash-bars, which is often troublesome in houses where there is much moisture, unless the roof has sufficient pitch to cause the water so condensed to run down the bars. For greenhouses we prefer a roof-angle of 40°.

In all cases these span-roofed plant structures should stand at right angles to the south, by which means all the light during the best part of the day is available, whereas if they stand in the opposite direction—that is, at right angles to the west—the plants are in shadow during the greater part of the day in winter, when they require all the light possible.

In addition to the side-lights being made to open, it is necessary to have ample means for roof ventilation. To secure this there are many contrivances, some of them very complicated

and often of a nature calculated to exclude light. There is nothing more simple or effectual than a hinged light on each side the ridge, about 2 feet in depth, worked with the usual lever and screw gearing; this allows air to be given even in wet weather, and at whichever side is most favourable; it also admits of abundant ventilation in hot weather. Further details of greenhouse construction will be found in chapter xvii, p. 199.

Air.—Plants grown under glass necessarily do not receive nearly so much fresh air as they get in their native habitats. Much has been written on the principles of ventilation for plant-houses, and yet nothing is more common than to see them treated in respect of air in a way that renders all other attention futile, it being either withheld at times when it should be admitted freely, or given in a continuous routine sort of fashion from a certain hour in the morning to a given time in the evening, regardless of the state of the weather or season. It is impossible for any plant to make favourable progress when subjected to cold draughts, yet we too often see, even in the spring, when young tender growth is in course of formation, the front-lights of plant-houses open right in the face of a keen cold wind that cripples the young leaves. Where, however, the side-lights of the house are made to open, as already advised, air can always be admitted on the side opposite to the direction from which the wind blows. The quantity of side air admitted must be regulated more by the state of growth the plants are in than by the temperature of the air, either within the house or externally. The temperature of a greenhouse in spring, when plants are making young growth, may be allowed to rise a few degrees too high rather than admit cold air in large volumes. In our fickle climate we often get several descriptions of weather in a single day. The careful cultivator will notice these changes, and regulate the admission of air accordingly, always bearing in mind that when the houses are closed in the after part of the day the greatest amount of growth is encouraged; later in the season, as the young growth becomes solidified and ripened, more air will be required in the day, as well as at night; but never, even when the wood and leaves are fully matured, should any plant be subjected to a keen draught, which is always more or less injurious.

Temperature.—The large variety of plants that are grown in a single greenhouse cannot

be provided with any special conditions which in nature they would enjoy, and this is particularly true in regard to temperature. Many greenhouse plants are not perceptibly injured by a degree or two of frost. On the other hand, many are seriously injured by being excited into premature growth by too high a temperature in winter when the other conditions are most unfavourable. To prevent this a low temperature is preferable, and the night temperature during winter for a general collection of greenhouse plants should be from 40° to 45°, or even 35° to 40° if the weather be very cold. The temperature during the day should be correspondingly low.

Watering.—This is by far the most important operation connected with the cultivation of plants in pots. The necessity for continuous attention and watchfulness as to the requirements of each individual plant where large collections are grown cannot be realized by any but those who have had experience in the matter. A deficient or superabundant supply of water probably causes the death of more pot plants than all other causes put together. It is of all matters connected with plant culture the most difficult to explain. Only by patient observation of the requirements of each particular species can the necessary knowledge be obtained.

Acquaintance with the conditions as to water under which a plant is found wild may be helpful, although it may not be advisable to try to imitate them. It may be taken as a rule that the finer the roots possessed by any plant the more impatient it will be of a deficiency or excess of water. On the other hand, thick, strong-rooted plants are generally able to support these extremes. Greenhouse plants of all kinds, when they receive water at all, require sufficient to thoroughly moisten the whole of the soil. Only aquatic or bog-plants require more than this; consequently, there is no great amount of knowledge required to know in watering how wet the soil ought to be made. The important point is to know what degree of dryness in the soil should be permitted before water is given. Many delicate-rooted, hard-wooded plants are killed by a single mistake in watering. The condition of the soil should be studied, and of course the condition of the plant, whether it be in vigorous growth or comparatively at rest, must also receive attention.

Soils.—The principal of these are:—*peat*, both bracken and heather used for hard-wooded

plants; *loam*, from that which contains a quantity of the roots of grasses, and is freer and more open in its texture, to that which is of a more adhesive nature; *leaf-mould* used largely for soft-wooded plants; *sand* and *manure*. The best time to lay in a stock of these is about July or August. It is better not to lay in more than sufficient to last a year. Both peat and loam should be stacked in the open, not in a dry shed, as they are difficult to work when dust-dry. The soil when used should contain sufficient moisture to cause the particles to adhere when pressed. On no account must any plant ever be potted in soil that is too wet. Loam of a yellow colour is generally the best; it should be procured from a common or old pasture that produces a thick, close sward, and as a rule the better and finer the quality of the grass the better the loam. That which contains anything of a red, irony nature should not be used, as it is unsuited to most things. The sand should be pure, sharp, and gritty.

In preparing soil for potting, whether peat or loam, it should be broken by hand for special plants, or chopped with a spade and put through a coarse sieve for ordinary plants—a sieve of 2-inch mesh is best for this purpose. In all cases the fibrous portion contained in the soil should be used amongst it, not discarding it as is sometimes done, as it is unquestionably the most important ingredient. For some things it is necessary to sift a portion of the earthy matter out, so that what is used may contain a greater proportion of fibre.

Open-air Treatment.—The majority of greenhouse plants are benefited by exposure in the open air for a few weeks after they have completed their growth, say from the last week in July to the first in September. This with most things gives ample time for ripening and hardening the season's growth. It is necessary to be careful for the first week or so not to expose the plants to the full sun, as whilst under glass they have been more or less shaded, and the sudden change may be hurtful. Many hard-wooded plants have their leaves injured in this way, and although this is not immediately apparent, they gradually assume an unhealthy brown colour from which they do not recover. In the case of delicate-rooted plants, especially those of a hard-wooded nature, the pots should be protected from the action of the sun, for the roots of a healthy plant lie thickly against the inner surface of the pot, and if the full force of the sun comes upon it injury is likely to result. The

pots should therefore be partly plunged in ashes or cocoa-nut fibre. A piece of old canvas or mat tied round the pots is the best remedy for large-sized plants; and in the case of small ones, if they are placed closely together, the heads of one row will generally afford enough shade to the pots in the row behind them, or thin boards, equal in width to the depth of the pots, reared against them at the sunny side, will effectually protect them. Heavy drenching rains may prove harmful, especially if there is a spell of dull wet weather. The simple expedient of laying them down on their sides, the rim of the pot resting betwixt a couple of bricks or small pots inverted, will prevent this. Precautions must be taken against the stopping of the holes at the bottom of the pots by worm-castings, &c. A thick layer, say 6 inches deep, of finely-sifted ashes should be placed on the surface where they are to stand; this is preferable to standing them on pots or bricks, which deprives the plants of the moisture and coolness at the root obtained by contact with the ground. The surface of the ashes should be damped every day in hot weather, as also should the material advised to be placed round the pots while standing out of doors.

Stopping and Pruning.—If a satisfactory result is to be attained the training of plants, with few exceptions, must be commenced in their infancy. If once a plant is allowed to run up with a long lanky stem it is difficult afterwards to get it into a satisfactory shape. In training pot-plants it is necessary to look to the form they will ultimately have. As a rule they should be so treated in their early stages as to ensure their being well furnished in after years with healthy foliage down to the base.

The observant cultivator will, in training any plant, take into consideration its natural habit. To ensure the requisite balance all shoots that have a tendency to outgrow others should be stopped back and bent down in a horizontal position, so as to induce them to break back freely, persevering in this treatment until the foundation for the future specimen is laid. In addition to the early training which plants require, many must also have their shoots shortened back yearly immediately after flowering.

II. THE CONSERVATORY.

The conservatory, to be enjoyable at all seasons, and particularly in winter, should be so situated as to be contiguous to, if not directly connected with the mansion, by means of a corridor, and so constructed and embellished

as to form an enjoyable promenade in all weathers. At the same time it must be admitted that the cultural requirements of the plants are not easily provided in many conservatories, which are often dark, dismal, heavy-looking structures, erected by architects who know nothing of horticultural art, and wholly unsuited either for the cultivation or preservation of plants.

Doubtless it is often difficult to combine in one structure the requirements of both architect and gardener, but at least the necessities of plant life should be so far met, that the building, however imposing, may not be converted into a vegetable charnel-house. Before, therefore, determining either the character or the most appropriate site for the erection, the designer should make himself fully acquainted with the capabilities of the position, having in view not only the general effect but the no less important point of suitability of aspect. Much depends upon the style of the mansion and its surroundings; and every place will present features peculiar to itself which must be carefully studied. Either a south, south-east, or south-west aspect is the most desirable, on account of admitting the greatest amount of light, especially in winter, when plants, whether in bloom or not, require all the light possible. Without abundance of light, indeed, their healthy preservation is impossible. [For details of the construction of the conservatory see chapter xvii, p. 199.]

Another point which is by no means unimportant is to guard against the near proximity of large trees, for these not only obstruct direct light and sunshine, but by their overhanging shadows throw a general obscurity over the interior. On the other hand, shelter from the north and north-east is most essential, as affording protection from the bitter, cutting winds, which should be shut out by distant plantations when necessary. Should the position be too much shaded for flowering plants, it will be advisable to furnish the house with Ferns, Cordylines, Palms, and such-like plants, which are best able to withstand such conditions.

To supply the necessary atmospheric heat the pipes of the warming apparatus must be judiciously placed. If the sides of the house are furnished with stone benches or iron shelves, the pipes will be hidden from view by placing them beneath these, otherwise they may be concealed in chambers underneath the pathways, and covered by cast-iron gratings of an open character, through which the heat

may freely pass upwards into the house. The heating surface should be sufficient to supply a temperature of 50° or 60° during winter, without overheating the pipes, as a mild heat from a moderately heated surface is much more congenial to vegetation than the same amount of heat obtained from one which is heated excessively. As conservatories are kept furnished during the winter months with a mixed assortment of plants, including plants in flower, it is necessary to maintain a temperature ranging in severe weather between 45° as a minimum and 55° as a maximum; this will most suitably meet the requirements of the great majority of plants grown in conservatories. Shading may be necessary during bright sunshine, but it should only be employed when really needed, and then only just sufficient to intercept the direct glare of the sun. For conservatories with side-lights of considerable height spring roller-blinds are much the best in every way.

Turning to interior arrangements, the form and capacity of the house must to a great extent govern the number and position of the walks, which should be bordered by an ornamental stone edging, and paved with tiles of some kind; they should be sufficiently wide to admit of freedom of movement. A few vases appropriately placed, and furnished with plants, will give both variety and interest. Mirrors may also be used, and when judiciously disposed they not only heighten the general effect, but vastly magnify the extent. A fountain or cascade may be admitted, as water always produces a pleasing refreshing effect, more particularly so when in motion; from the roof may be suspended graceful plants growing in baskets. Statuary, if used at all in the interior, should be introduced in moderation, the vestibule being the more appropriate place for it.

A conservatory that is connected with the mansion should be provided with artificial means of lighting, and with electricity as a lighting medium this is easily managed without danger to the plants. If gas be used there is nothing to surpass the "Sunlight" burner fixed in the apex of the roof, with means of ventilation above, so as to carry off the impure air. The *bye-pass* arrangement should also be adopted. Gas should not be used at a lower level, otherwise if the plants be higher there will be the risk of injury. As a last resource, candles are better and safer than oil-lamps of any kind, save the most costly and scientifically-constructed ones.

If the central portion of the house is to be planted with permanent plants, it is essential to provide efficient drainage by means of drain-pipes, over which 8 or 10 inches of coarse brick rubble or clinkers may be placed, and over these a layer of fibry turf, grass-side downwards. The space left for soil should average about 2 feet in depth. As over-luxuriance of growth is objectionable in the plants permanently planted out, a simple soil, such as fibrous loam, is to be preferred, adding brick rubble and coarse sand to ensure porosity and also to keep the mass in a healthy state. The soil should be chopped coarsely, and the whole well mixed as it is put into the bed. A fine soil is for many reasons objectionable.

In furnishing the house with plants, especially such as are to be permanent features, it is necessary to have regard to the conditions as to light and heat. If both foliage and flowering plants are to be accommodated, it is difficult to lay down rules for planting. Pleasing effects may be produced by giving prominence to such striking plants as *Dracænas*, Palms, Cycads, and Tree-Ferns. It is necessary to avoid crowding; and to leave spaces, more particularly around the sides, for plants in pots. This secures a frequent change of group, and gives an opportunity of introducing flowering plants in their season, most of which can be more successfully grown in other houses and exhibited to advantage when at their best by removal into the conservatory.

If side-stages are provided, these are easily furnished with the smaller decorative plants, which, as a rule, are to be obtained in well-equipped gardens in great variety, and which are always a source of interest. It is pleasing to observe that a more natural and picturesque arrangement of the plants is being obtained now than formerly.

Foremost among the plants suitable to form the principal features in a conservatory must be placed the Palms, usually of majestic proportions and elegance. Many of them, however, attain large dimensions, and their use, except in very large houses, must be limited, selecting for small arrangements the slender-growing kinds and such as are of low stature. For central positions they should have well-formed stems, of sufficient height to stand clear of the other plants. Particulars as to habit, height of stem, and temperature required by Palms will be found in the chapter devoted specially to them.

Cycads are also remarkably effective when used in the conservatory. Most of them, how-

ever, require a stove temperature, the only exceptions being *Cycas revoluta*, *Dioon edule*, *Encephalartos Altensteinii*, *E. villosus*, *E. horridus*, and *Macrozamia spiralis*.

The forms of *Cordyline australis*, popularly known as *Dracænas*, are most elegant for isolated planting. *Aralia Sieboldii* and *A. papyrifera* are also very eligible and of distinct character for planting out or for pots; when grown well they attain large dimensions, flowering freely and producing racemes of berries which are very ornamental. They require an abundance of water. The closely-allied genus *Panax* also affords a few species of striking appearance for the conservatory, namely, *P. crassifolium*, *P. longissimum*, *P. Mastersianum*, and *P. trifoliatum*. *Aralia leptophylla*, *A. elegantissima*, and *A. Veitchii* are good plants for the conservatory when planted out and allowed to assume their proper character.

Such genera as *Agave*, *Dasyliirion*, *Beaucarnea*, *Yucca*, *Musa*, *Araucaria*, *Acacia*, *Aspidistra*, *Rhododendron*, *Bambusa*, *Phormium*, *Doryanthes*, &c., &c., may be made to contribute to the beauty and interest of the large conservatory.

The stately grandeur of the arboreal Ferns renders them particularly suitable for a large conservatory. Those available for this purpose are:—

<i>Alsophila aspera.</i>	<i>Dicksonia antarctica.</i>
„ <i>australis.</i>	„ <i>arborescens.</i>
„ <i>excelsa.</i>	„ <i>fibrosa.</i>
„ <i>procera.</i>	„ <i>Lathamii.</i>
„ <i>robusta.</i>	„ <i>squarrosa.</i>
<i>Cyathea dealbata.</i>	„ <i>Youngiae.</i>
„ <i>Dregei.</i>	<i>Hemitelia Smithii.</i>
„ <i>gracilis.</i>	„ <i>capensis.</i>
„ <i>medullaris.</i>	

Tree-Ferns do not require a large amount of pot-room, as they derive the greatest portion of their nourishment from the moisture supplied to the stems, which should be frequently well damped. We would, therefore, strongly recommend their being plunged in pots, in preference to their being planted out.

The flowering plants that can be advantageously planted out in such arrangements are few; neither can permanent brilliancy be so fully or satisfactorily ensured in this way as by adding plants in pots—this plan affording an unlimited opportunity of lighting up the house with fresh and varied aspects at different seasons of the year. However, there are one or two exceptions, such as *Luculia gratissima*, a plant that is somewhat impatient of root restriction, but which is quite at home planted out in such

a mild temperature. If space permits, a few Camellias would be valuable for the production of early blooms; *Acacia dealbata* is also worthy of a place for its elegant foliage, and *A. armata* for its floriferousness. A place should be given to *Pittosporum Tobira*, *P. lucidum*, *P. undulatum*, and *Clethra arborea*, all of which have delightfully-scented flowers. *Datura suaveolens* is also a most fragrant plant, which would be worthy of a place in such an arrangement.

To afford relief and break the formality of the architectural lines, climbing plants are most



Fig. 638.—Climber-screened Pillar in a Conservatory.

serviceable. They may be trained to the pillars or dependent from the roof, or be suspended in baskets. Foremost amongst them stands the lovely *Lapageria rosea* and its white variety. *Tacsonia Van Volxemii* is of rapid growth, and produces a profusion of rich crimson blooms. *T. ignea*, *T. exoniensis*, and *T. insignis*, *Passiflora Bellottii*, *P. cœrulea*, *P. Imperatrice Eugenie*, are all free-growing, and showy. *Trachelospermum* (*Rhynchospermum*) *jasminoides* is a good plant for a pillar; *Jasminum grandiflorum* is one of the sweetest and most desirable climbers for clothing a wall or pillar. *Acacia dealbata*, *A. Riceana*, *Bignonia Cherere*, *Clematis indivisa*, *Lonicera semperflorens*, *Mandevilla suaveolens*, *Habrothamnus elegans*, *Hoya carnosa*, *Plumbago*

capensis—most suited for a pillar, *Tropæolums*, and various other plants, might be named as applicable for roof-adornment. It would be objectionable to plant coarse-growing things to obstruct the light, and weaken the growth of the plants underneath. Neither should a preponderance of deciduous plants be used.

Suspended wire-baskets are admirably adapted for the display of many plants such as *Achimenes*, *Pelargoniums*, *Begonias*, *Tropæolums*, *Fuchsias*, *Asparagus*, &c. In winter nothing is more effective than the varieties of *Epiphyllum truncatum*. *Tradescantias* may also be used. Also Ferns, such as, for example, the *Davallias* with creeping rhizomes, *Lygodium*, *Nephrolepis*, *Acrostichum*, *Adiantum*, *Asplenium flabellifolium*, and *A. longissimum*. Some of the *Selaginellas* do well as basket-plants, especially *S. cœsia* and *S. Wildenovii*. Plants grown in baskets thus suspended require an abundant supply of water, or they soon become seared and shabby.

CHAPTER XXIX.

LIST OF GREENHOUSE PLANTS.

Abutilon.—A shrubby genus of the Mallow family with pendulous, bell-shaped flowers. They are of easy culture, flowering freely when grown in pots or planted out and trained to pillars or rafters, or grown as bushes. Cuttings. Loam and peat.

A. Darwini has large palmatifid leaves and orange-red flowers with dark veins. Brazil. There are numerous garden hybrids, of which *Boule de Neige*, white; *Boule d'Or*, yellow; *Eclipse* and *Fire Fly*, red; *Golden Fleece*, yellow; and *King of the Roses*, rose, are among the best.

A. megapotamicum variegatum has small leaves, mottled green and yellow, and red and yellow flowers 2 inches long.

A. vitifolium has handsome leaves five- to seven-lobed, and blue flowers. Chili.

Acacia.—A large useful genus of Leguminosæ. About four hundred species are known, many of them Australian and known as Wattles. Some form bushes a foot or so high, others are large trees. The phyllodes or false leaves vary from mere spines to leaf-like structures 6 or 8 inches long by 2 inches wide. The flowers are in small fluffy balls, in racemes or panicles. Peat and loam. They flower from Christmas onwards. After flowering they must be well pruned. Some species are useful for clothing pillars.

A. armata. Small spiny leaves, fragrant flowers; forces well. Var. *angustifolia* is a variety with longer, narrower leaves.

A. Baileyana. Glaucous, pinnate leaves, deep-yellow flowers.

A. cultriformis. Knife-shaped glaucous leaves; a pretty pot plant.

A. dealbata (Silver Wattle, Mimosa). Large tree, glaucous, bipinnate leaves, yellow flowers in large, branching racemes. Grown largely in France for market.

A. Drummondii. Bush; pinnate leaves, lemon-coloured flowers.

A. hastulata. Small spiny leaves, pale-yellow flowers, crowded on scandent shoots a yard long.

A. leprosa. Scandent, suitable for pillars; very free.

A. longifolia. Strong bush, upright racemes; very free.

A. myrtifolia. Short leaves, flowers in short racemes, pale-yellow.

- A. neriifolia*. Long narrow leaves, pale-yellow flowers.
A. obliqua (ovata). Oblique leaves, small flowers; one of the best for pots.
A. platyptera (fig. 639). Winged stems, deep-yellow flowers.

Fig. 639.—*Acacia platyptera*.

- A. pubescens*. Tree; bipinnate leaves. Primrose-scented flowers.
A. pulchella. Pinnate leaves, yellow flowers, in solitary heads.
A. retinodes. Scandent shoots; good for pillars.
A. Riceana. An elegant plant with small needle-like leaves and pale flowers; good for pillars.
A. urophylla. A free-growing plant, with white flowers.
A. verniciflua. Small leaves and flowers; very free.
A. verticillata. One of the best for large houses. Spiny leaves, pale-yellow flowers in short racemes.

Acer (Japanese Maples).—Though hardy at most times a little protection is necessary in early spring when growth commences. The finely-divided and parti-coloured leaves of many of the forms of *A. japonicum* and *A. palmatum* make them very useful for decoration in early spring. Loam. Plunge outside after growth is completed.

Agapanthus.—Well-known, easily-grown plants, with strap-shaped leaves and large umbels of blue or white flowers on tall erect stems. South Africa.

A. umbellatus has leaves 2 to 3 feet long, and blue flowers. The best varieties are: *albus*, white; *excelsus*, blue, very robust; *flore pleno*, double blue; *variegatus*, small leaves, green and white.

Agapetes.—Vaccinium-like evergreen shrubs from Northern India. Flowers in several species are borne on parts of the plant several years old. The flowers are mostly ornamental; or the *Pernettya*-like fruit is the chief attraction. Cool, airy house. Sandy peat. Cuttings.

- A. buxifolia* (fig. 640). A bushy shrub, with ovate leaves and scarlet tubular flowers 1 inch long. Fruit white.
A. macrantha (Thibaudia). Leaves 3 inches long, flowers large, five-angled, white with wavy red lines. Scandent habit.
A. Manni. Small acuminate leaves, red fruit.
A. obovata. Similar to *A. Manni*, with blunt leaves.
A. setigera. Red flowers in small racemes.
A. variegata (pulcherrima). Leaves leathery, ovate, flowers in dense racemes, red, tipped white. Scandent habit.

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Agathæa celestis, the only species cultivated, has blue Daisy-like heads of flowers an inch across, and is popularly called the "Blue Marguerite". Cuttings any time. Loam. S. Africa.

Agathosma.—Heath-like shrubs from S. Africa. Several species are in cultivation, the most common being *A. imbricata*, with small crowded leaves and flat terminal heads of light-purplish flowers. There is a variety with white flowers. Cool, airy greenhouse. Cuttings. Sandy peat.

Albuca.—Bulbous plants from S. Africa. The only ornamental species in cultivation is *A. Nelsoni*, useful for indoor borders, as it grows and flowers well in shade. Flowers white, in umbels, on stems 2 feet high. Loam.

Alonsoa incisifolia, a Chilean plant with small scarlet flowers in terminal racemes and small finely-cut leaves 1½ foot high. Soft-wooded. Loam and leaf-mould. Seeds.

Aralia.—Trees or shrubs with simple or compound leaves. Few plants respond more readily to border culture. Loam and peat. Seeds, cuttings, or grafts.

A. crassifolia (fig. 641). Simple or trifoliate leaves. New Zealand.

A. elegantissima. Usually grown in a stove. Makes digitate leaves 2 feet across, with leaflets a foot long and 3 inches wide, if planted in a cool house.

A. peltata. Large deeply-lobed leaves, 15 inches across.

A. reticulata (Meryta Denhami). Usually a single-stemmed plant with a head of large oblong leaves. New Caledonia.

Araucaria.—The indoor species merely require protection from frost. Cuttings of terminal growths from cut-back plants. Loam and peat.

A. Bidwillii (Bunya-Bunya Pine) has dark, leathery, sharp-pointed leaves and round cones the size of a man's head. Moreton Bay.

A. excelsa (Norfolk Island Pine) is of elegant plumose habit, and is largely grown for decoration. The most distinct varieties are *compacta* and *glauca*.

A. Rulei. Leaves larger and thicker than in *A. excelsa*.

Fig. 640.—*Agapetes buxifolia*.

Araujia.—Climbing *Asclepiads* from South America, of which *A. sericifera (Physianthus albens)*, a strong twining

plant with white flowers nearly an inch across, and *A. grandiflora*, with larger hairy leaves and Stephanotis-like flowers, are useful for the greenhouse. Loam and peat.

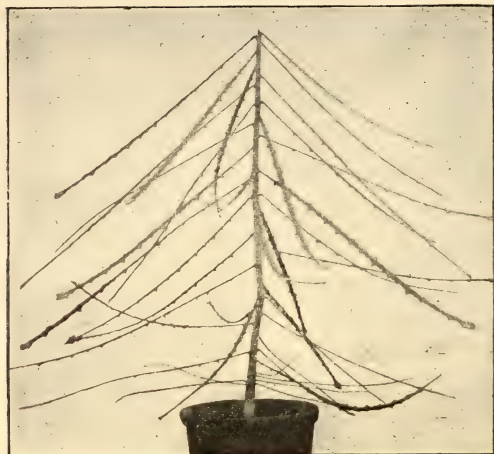


Fig. 641.—*Aralia crassifolia*.

Arundinaria.—Bamboos, some of which are suitable for the greenhouse. They succeed best in loam, and should be transplanted at the commencement of the growing season. The following are Himalayan:—

- A. falcata*. Leaves pale-green; stems 12 feet high.
- A. Falconeri*. An elegant plant, 15 feet high.
- A. hookeriana*. A coarser-growing plant than the foregoing.
- A. nobilis*. Very like *A. Falconeri*.

Asparagus.—Bushy or climbing, deciduous or evergreen plants, invaluable for floral decorations or as decorative pot or basket plants. The berry-like fruits of several are ornamental. *A. falcatus* and *A. umbellatus* are worth growing for their flowers. Loam and peat. Seeds, division, or cuttings.

A. crispus. Dwarf, with slender twisted stems. Small pale-green leaves and inflated fruits. S. Africa.

A. davuricus. Deciduous, very like the common Asparagus; suitable for baskets.

A. falcatus. A strong grower. Stems 30 feet long, armed with stout prickles; leaves 2 inches long; free bloomer. Good for pillars. Tropical Asia and Africa.

A. medeoloides (*Myrsiphyllum asparagoides*), "Smilax". A climbing plant with ovate leaves. Useful for cutting. S. Africa.

A. plumosus. An elegant, useful plant for masses or baskets. S. Africa. Var. *nanus* has flat, frond-like branches, and is largely grown for market.

A. Sprengeri. Small deep-green leaves, red fruit. Good basket plant. Natal.

A. umbellatus (fig. 642). A handsome climber, shoots 20 feet long; olive-green leaves an inch long, and bearing in autumn umbels of starry-white flowers a quarter of an inch across. Canary Islands.

Babiana.—Dwarf bulbous plants from S. Africa, with hairy, plicate leaves and brilliant-coloured, Ixia-like flowers. *B. disticha*, pale-blue; *B. plicata*, purple; *B. stricta* and varieties, blue, red, yellow, or white; *B. tubata*, yellow and red; and *B. tubiflora*, red.

Backhousia myrtifolia.—A Myrtle-like plant with terminal corymbs of white flowers succeeded by rose-coloured persistent calyces. Peat and loam. Cuttings. Australia.

Banksia.—Australian evergreen shrubs which require to be grown in a cool, airy house in well-drained pots, in a mixture of fibrous peat, loam, charcoal, and bits of sandstone. The flowers are arranged in large cones.

B. grandis. Handsome pinnatifid leaves a foot long.

B. integrifolia. Oblong leaves 6 inches long by 1 inch wide.

B. marginata. A bushy plant with small blunt leaves.

B. serrata. Very strong; corky bark; serrated leaves; flower-heads 4 to 6 inches long, 3 inches wide.

Blandfordia.—Australian bulbs with Rush-like leaves and large bell-shaped, yellow or orange-yellow flowers in umbels or racemes. Summer. Sandy peat in well-drained pots. *B. aurea*, yellow; *B. Cunninghamii*, red and yellow; *B. marginata*, orange-red; and *B. nobilis*, orange with paler margins, are the best.

Bomarea.—South American climbers, with flowers like *Alstromeria*; should be grown on the rafters of a sunny greenhouse. Loam and peat.

B. acutifolia. Scarlet and yellow flowers in large umbels.

B. Caldasiana. Yellow with scarlet spots; very free.

B. Carderi (fig. 643.) The largest. Flowers in very large, loose, drooping umbels, pink and green with crimson spots.

B. patacocensis. Large umbels of dark-red flowers.

Boronia.—Australian shrubs, with usually pretty, red, rose, or brown fragrant flowers. Should be grown in a cool, airy house and carefully watered, especially in winter. Fibrous peat.

B. elatior. Leaves pinnate, flowers rosy-red in dense clusters along the upper half of the young branches.

B. heterophylla. A compact bush with crowded erect branches, pinnate leaves, and numerous globose bright-red flowers. Spring.

B. megastigma. Flowers brown and yellow; very free and fragrant. Spring.

B. serrulata. A dwarf plant with simple leaves; very floriferous; flowers deep-rose.

Bossiaea.—Elegant shrubs from Australia, with pretty, yellow, Pea-shaped flowers. *B. cinerea*, yellow marked with



Fig. 642.—*Asparagus umbellatus*.

purple; *B. foliosa*, yellow and orange; *B. heterophylla*, yellow and red; *B. scolopendria*, yellow and red. Late spring. Peat. Seeds or cuttings.

Brachysema.—Australian Leguminosæ with long scandent shoots and ovate leaves; flowers red. Cool greenhouse. Peat. The best known are *B. acuminatum*, with silvery, ovate leaves an inch long, and red flowers

1½ inch long; and *B. subcordatum*, with smaller leaves and flowers.

Browallia.—Blue- or white-flowered annuals from S. America. Seeds should be sown in spring, and the



Fig. 643.—*Bomarea Carderi*.

young plants grown in an intermediate temperature. They flower from midsummer onwards. *B. demissa* has blue, white, or purple flowers; very free. *B. speciosa*, var. *major*, has large leaves and blue flowers 1 inch across.

Brunsvigia.—African bulbous plants, which thrive when grown in a sunny greenhouse; they require plenty of water while growing, followed by a long, dry rest. Fibrous loam.

B. Josephineæ. Bulb very large; leaves 2 feet long; flowers purplish, in umbels on scapes 2 feet long.

Buddleia *Colvillei* is a large shrub with Pentstemon-like red flowers, an inch across, in long racemes. Himalaya. *B. madagascariensis* has large silvery leaves and long racemes of small yellow flowers. *B. variabilis* has lilac flowers; very free. Summer. Loam. Cuttings.

Calceolaria.—In addition to the popular garden race the following are worth cultivating in the greenhouse:—

C. alba. A small bush with linear, serrated leaves and white flowers. Chili.

C. Burbidgei (fig. 644). A bush 6 feet high, with large lyrate leaves and loose heads of rich-yellow flowers. Garden hybrid.

C. fuchsiaefolia. A compact, woody shrub, with lance-shaped, Fuchsia-like leaves and pretty yellow flowers. Peru.

C. violacea. Small ovate leaves; flowers lilac spotted with violet. Chili.

Callicarpa purpurea is a loose, free-growing Chinese shrub with long shoots, bearing bright-purple berries in profusion in winter. Loam.

Callistemon.—Evergreen, peat-loving shrubs of the Myrtle family. Their flowers are arranged round the young stem in a dense mass, hence the popular name "Bottle-brush". The best species are: *C. brachyandrus*, yellow flowers; *C. coccineus*, red; *C. rigidus*, crimson; *C. salignus*, red; and *C. speciosus*, crimson.

Campanula.—The following species are worth growing for the greenhouse:—

C. pyramidalis. A biennial raised from seeds sown in summer, the plants being grown on to flower in 10-inch pots when two years old. They require protection from damp in winter.

C. Vidalii, a perennial from the Azores; has white flowers borne on upright, leafy branches in summer. Seeds. Loam.

Canarina campanulata should be potted and started into growth in January; if given a little heat the flowers will be developed in March. It has a thick, fleshy root, with a tall stem and hastate leaves, and bears numerous Fritillaria-like, orange-red flowers. Loam. Canaries.

Cantua.—Scandent shrubs from S. America, suitable for training against a pillar or wall in a sunny greenhouse. The leaves are small and the flowers tubular in drooping clusters at the ends of the branches. Loam. Cuttings.

C. bicolor has short-tubed, scarlet and yellow flowers.

C. buxifolia (dependens) (fig. 645) has long-tubed, red flowers.

Capsicum.—The ornamental fruits of these are pretty in the greenhouse. From seeds sown in spring, in heat, well-fruited specimens may be had in 6-inch pots by the autumn. They are forms of either *C. annum* (Chilies) or *C. minimum* (Cayenne Pepper).

Carex.—Two species are worth growing for their light, graceful foliage, viz.:—

C. brunnea (japonica) variegata. A neat plant, with narrow variegated leaves.

C. scaposa. With wide leaves and brownish flowers. Loam.

Cassia.—Showy Leguminous shrubs with yellow flowers. Some are large bushes which flower throughout the summer and autumn; these are useful for the border. Loam and peat.

C. australis. Small bush; pinnate leaves; yellow flowers. Australia.

C. corymbosa. A large bush with dark-green leaves and large corymbs of yellow flowers. May be treated as a climber. Trop. America.

C. laevigata. Strong bush; large leaves and corymbs of yellow flowers. Tropics.

C. occidentalis. Large pinnate leaves and yellow flowers. Tropics.

Casuarina.—Trees suggestive of *Equisetum*, the



Fig. 644.—*Calceolaria Burbidgei*.

branches being pendulous, thin, and leafless. The stems are corky. Seeds. Peat or loam.

C. equisetifolia is called in Australia the "Swamp Oak".

C. suberosa has very slender branches and very corky stems.

Cavendishia.—Scandent shrubs with tubular, Erica-like flowers. Sandy peat. There are but a few species, of which the Mexican *C. acuminata*, with ovate leaves and terminal racemes of bright-red flowers, is the best known.



Fig. 645.—*Cantua buxifolia* (dependens).

Celmisia.—Shrubby composites, natives of New Zealand. The cultivated species, *C. Munroi* and *C. spectabilis*, have a short stem bearing a rosette of leaves which are dark-green, the under surface clothed with a dense silky-white felt. Flowers Daisy-like, 2 inches across, the ray florets white, the disc yellow. Sandy peat.

Celosia.—Of the many species *C. cristata* and its forms are the only useful sorts for the greenhouse. Seeds sown in March in heat soon germinate. The seedlings should be placed early in small pots, and repotted again and again until they are in 6-inch pots. *C. cristata*, the "Cockscomb", grows about 9 inches high, but the variety *pyramidalis* grows 2 to 3 feet, branches freely, and bears terminal feathery plumes of white, yellow, or crimson flowers. Loam, leaf-mould, manure.

Celsia.—Biennials closely resembling *Verbascum*. The two best species for indoors are *C. Arcturus*, a bushy plant 3 feet high with large yellow flowers, and *C. cretica*, which usually makes a single stem 4 to 5 feet high and has yellow flowers an inch across. Loam.

Cestrum (*Habrothamnus*).—Scandent shrubs with terminal heads of red or yellow flowers, of easy culture, and useful for covering walls or pillars. After flowering they should be spurred hard back. Loam. Cuttings.

C. aurantiacum. Glabrous leaves; golden flowers in terminal panicles, produced in July, September, and December. Guatemala.

C. elegans. Leaves hairy; flowers red, in large terminal cymes. Winter and spring. Mexico.

C. Newellii. Like *C. elegans*, but scarlet flowers. March to May.

Cheiranthus *mutabilis*, from the Canary Islands, is of bushy habit, and has light-purple flowers. Hybrids

between it and *C. Cheiri* have been raised which promise to become useful winter-flowering plants. They are *C. hybridus*, with yellow and purple flowers, and *C. kewensis*, with fragrant flowers an inch across.

Chironia.—South African Gentians, which bear pink or purple flowers with great freedom. *C. floribunda* has numerous thin stems a few inches high, small leaves, and pink flowers; *C. tinoides* (*ixifera*) is an upright bush a foot high, with glaucous leaves and pink flowers; *C. peduncularis* has larger leaves and flowers. Peat and loam.

Chlorophytum.—Tufted Liliaceous plants. *C. elatum*, var. *variegatum*, is an ornamental plant with elegant white and green leaves; useful for decorations; stands well in rooms. Loam. S. Africa.

Chorizema.—Pretty little Australian shrubs with small Pea-shaped, red and yellow flowers. May be grown as bushes or trained on low trellises. Sandy peat in a cool, airy house. Spring. *C. cordatum* (fig. 646), *C. ilicifolium*, and *C. varium* are the best.

Chrysocoma *Coma-aurea* is a South African composite of dwarf bushy habit, and bears small heads of yellow flowers in summer. Loam.

Cistus.—A few of the more tender species are worth growing for the greenhouse. They are: *C. crispus*, with reddish flowers; *C. oyprius*, white; *C. monspeliensis*, white; and *C. purpureus*, purple. Loam. Cuttings.

Citrus.—Greenhouse evergreens, including the Orange and the Lemon. They require heat in spring when commencing to grow, afterwards plenty of air and sunlight. Flowers are produced at all times.



Fig. 646.—*Chorizema cordatum*.

C. Aurantium (Sweet Orange). Of this there are many forms, that known as the Otaheite Orange being a small bush which fruits freely when only a foot or so high.

C. Decumana, the Shaddock or Pomelo. A large-leaved tree.

C. medica, var. *Limetta*, the Sweet Lime.

C. medica, var. *Limonum*, the Lemon. Of this there is a form, Metford's Lemon, which has fruits nearly three pounds in weight. *C. nobilis*, var. *Tangerina*, is the Tangerine Orange.

Clematis indivisa, from New Zealand, is an excellent greenhouse climber, with dark-green, ternate leaves and large panicles of white flowers.

leaves, and yellow fragrant flowers in small erect umbels. Loam and peat. S. Europe.

Correa.—Dwarf Australian shrubs with small ovate leaves and pendulous, tubular flowers. They flower all winter in a light, cool, airy house. Cuttings, or grafted on *C. alba*.

C. alba has yellowish-white flowers $1\frac{1}{2}$ inch long.

C. cardinalis has thin stems, sparsely clothed with small dark-green leaves, and large flowers of a bright cardinal-red colour.

C. speciosa has red flowers. There are many named varieties, differing principally in flower colour.

Crinum.—Bulbous evergreen or deciduous plants, with usually large leaves, and large handsome flowers, white, pink, or purple, in umbels, on stout stems well above the leaves. They should be grown in large pots or borders in rich loamy soil. The following thrive in the greenhouse:—

C. latifolium. Leaves long and broad, wavy; flowers in large umbels, white.

C. longifolium (*capense*). Long narrow leaves, white flowers.

C. Macowani. Leaves 3 feet long; flowers white, tinged red.

C. Moorei. One of the best; very strong; large leaves, flowers white, suffused with rose. Var. *alba* has pure-white flowers, and var. *variegata* has variegated leaves.

C. Powellii. A hybrid between *C. longifolium* and *C. Moorei*, intermediate in character.



Fig. 647.—*Clianthus Dampieri*.

Clethra arborea, the "Lily of the Valley Tree", from Madeira, forms a large bush or small tree with oblong glossy leaves and large panicles of waxy-white, fragrant flowers. Loam and peat.

Cleyera japonica, var. *variegata* (*Eurya japonica*), is a Japanese shrub with the habit of a Laurel, and has ovate, green yellow and brown leaves. Much used for decorative work. Loam. Cuttings.

Clianthus.—Bright-flowered climbers, among the most striking of the Leguminous order. *C. Dampieri* (fig. 647), the "Glory Pea" of Australia, has herbaceous stems, silky, pinnate leaves, and racemes of four to six flowers, which are bright-red with a large purple, eye-like blotch. It is difficult to grow, but good plants are sometimes obtained when grafted on stocks of *Colutea*. *C. puniceus*, the "Parrot's Bill", has long scandent shoots, and is a good plant for pillar or rafter. It has green leaves and pendent clusters of scarlet flowers. Loam and peat.

Cobæa scandens is a quick-growing, coarse climber, with pinnate leaves and tubular flowers 3 inches long. Var. *variegata* has golden variegated leaves. Both are useful for large houses.

Coleus thyrsoides (fig. 648), from Africa, is a bushy herb with Nettle-like leaves and large, erect, terminal panicles of bright-blue flowers, which last for six weeks in mid-winter. It succeeds well if grown with *Chrysanthemums*.

Cordylina.—Of the true Cordylines as distinguished from *Dracenas*, the species most serviceable in the greenhouse are:—*C. australis*, which is useful when small for table decoration, and when planted out it attains a height up to 40 feet. The flowers are white, in large upright panicles, and very fragrant. Var. *Doucettii* has variegated leaves; *lentiginosa* has purple leaves; *gracilis* has narrow rigid leaves. *C. indivisa* is a distinct species with wide leaves with a broad red midrib. Loam.

Coronilla glauca is a useful greenhouse plant of easy culture; it has slender, erect stems, glaucous, pinnate



Fig. 648.—*Coleus thyrsoides*.

Crotalaria.—Leguminous shrubs, with pinnate leaves, and yellow flowers. *C. longirostrata*, from Mexico, is one of the best. It has small leaves, and bears long upright

racemes of large deep-yellow flowers in autumn and winter. Cuttings or seeds. Loam and peat.

Crowea.—Small Australian shrubs belonging to Rutaceæ. The two species in cultivation are *C. angustifolia*, with solitary red flowers nearly an inch across, and *C. saligna* (*latifolia*), which has larger leaves and pink flowers. Sandy peat. Cuttings.



Fig. 649.—*Cyphomandra betacea*.

folia, with solitary red flowers nearly an inch across, and *C. saligna* (*latifolia*), which has larger leaves and pink flowers. Sandy peat. Cuttings.

Cupressus funebris (*Cashmeriana*, var. *pendula*) is one of the handsomest of all Conifers. The branches are pendulous and the foliage glaucous. It is too tender to grow outside, and is quite happy in a conservatory in pot or border.

Cyphomandra.—*Solanum*-like, with a thick fleshy stem, large leaves, and Potato-like flowers. *C. betacea* (fig. 649), the "Tree Tomato", grows 12 to 15 feet high, and forms a large branching head clothed with cordate leaves a foot long, and white flowers, succeeded by Plum-like edible fruits which are orange-red when ripe. Over two hundred fruits have been borne by a single plant. *C. fragrans* has smaller glossy leaves, and purple and yellow fragrant flowers. A useful plant for large houses. Loam. Cuttings or seeds.

Cytisus (*Genista*).—Useful shrubs. The greenhouse species are natives of Southern Europe or the Canaries. Loam and manure. Cuttings or grafts.

C. canariensis. Dense habit, small leaves and flowers.

C. filipes. Loose elegant habit, white flowers.

C. fragrans (*racemosus*). Bushy habit, dense racemes of yellow flowers; forces well.

C. fragrans, var. *elegans*, is larger than the type; a very useful plant. Must be grafted.

Daphne.—Evergreen or deciduous shrubs with fragrant flowers. *D. odora* (*indica*) is an evergreen Japanese plant with compact heads of white and pink flowers produced in winter. *D. Dauphini* (*odora* × *sericea*) has purple flowers. Loam and peat. Cool, airy house or frame.

Darwinia (*Genetyllis* and *Hederoma*).—Australian evergreen shrubs of Heath-like habit. The small flowers are enclosed in bells formed of bright-coloured bracts. Several species are in cultivation, of which *D. fimbriata* has small oblong leaves and roundish pink heads of flowers and bracts, and *D. macrostegia* (*tulipi-*

fera) has larger leaves and larger heads of flowers with yellow and red bracts. Peat.

Dasyliiron.—Mexican Liliaceæ with thick woody stem and a large head of long elegant leaves. Flowers in panicles on stems 10 or 12 feet high. Useful for large conservatories. Sandy loam. *D. acrotrichum*, with serrated leaves, and *D. glaucophyllum*, with gray-green unarmed leaves, are two of the best.

Datura (*Brugmansia*).—Solanaceous shrubs or herbs from S. America, with large trumpet-shaped flowers. Should be allowed plenty of root-room. The annual species make nice plants in 6-inch pots. Loam. Cuttings.

D. arborea. Large bush, white flowers 8 inches long.

D. chlorantha. Large bush, handsome yellow flowers.

D. fastuosa. Annual; large purple flowers.

D. sanguinea (fig. 650). Large bush, red flowers striped with green.

D. suaveolens. White flowers, fragrant, very free.

Desfontainea spinosa.—A Holly-like bush with tubular flowers $1\frac{1}{2}$ inch long, scarlet, tipped with yellow. Peru. Peat and loam. Sunny, airy house.

Dillwynia.—Heath-like shrubs with small yellow or reddish Pea-shaped flowers. Several species are in cultivation, of which *D. ericifolia*, with small leaves and yellow flowers, and *D. floribunda*, with larger leaves and flowers, are useful. Sandy peat. Australia.

Diosma ericoides.—A Heath-like shrub from South Africa remarkable for its fragrant foliage; flowers white. Sandy peat. Cuttings.

Diospyros Kaki, the "Date Plum" or "Persimmon", is a Magnolia-like tree with orange-coloured edible fruits as large as a Peach. There are numerous varieties, which differ in the size, flavour, &c., of the fruits. Loam. Japan.

Doryanthes excelsa and *D. Palmeri* are handsome Amaryllids which form enormous *Dracæna*-like rosettes



Fig. 650.—*Datura sanguinea*.

of strap-shaped green leaves 8 to 10 feet long and 4 inches wide. The flowers, which are rarely produced, are borne on tall pole-like stems, and are very handsome. Australia. Loam and peat.

Echium.—The shrubby "Buglosses" from the Canary Islands are handsome flowering plants with rough hairy leaves and large dense terminal heads of blue, red, or white flowers. The best known is *E. callithyrsum*

(fig. 651), a large bush with erect large heads of blue flowers. Seeds.

Epacris.—Free-flowering Australian shrubs of Heath-like habit, useful for the greenhouse in winter and spring.

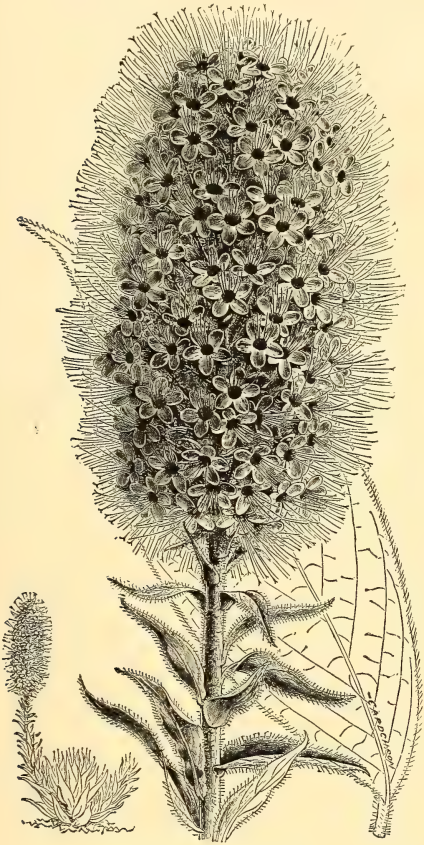


Fig. 651.—*Echinum callithyrsum*.

After flowering they should be cut back and placed in an intermediate temperature until growth recommences. They should then be repotted in sandy peat, and when established they should have all the air and light possible. The new shoots may be stopped until the middle of June; after that time strong long shoots must be encouraged, which will produce flowers from almost every leaf-axil. A few species and a large number of varieties are in cultivation, of which the following is a selection:—*E. longifolia*, scandent habit, with long tubular flowers, bright-red, tipped white; *E. purpurascens*, var. *flore pleno*, white, double flowers. Of varieties, *Exquisite*, pink; *Fireball*, scarlet; *Alba* and *Candidissima*, white; *Fulgens*, red; *miniata splendens*, horizontal habit, long flowers, rich-scarlet and white; *Rubra Superba*, red; and *The Bride*, white. Sandy peat.

Eriobotrya japonica.—The "Loquat" is an ornamental tree with handsome leaves often a foot long and 4 inches wide; cultivated for its small orange-coloured, apple-shaped fruit, which in some places is much esteemed. Loam. China and Japan.

Eriostemon.—Evergreen, peat-loving, compact shrubs from Australia. Flowers usually white and fragrant. They do well when grown either in pots or borders.

E. buxifolius. Small Box-like leaves and white flowers.

E. myoporoides. Leaves 2 inches long, narrow; flowers half an inch across.

E. neriiifolius. Lanceolate leaves, orange-like blossoms; free.
E. scaber. Linear leaves and white, pink-tinted flowers.

Erythrina.—Leguminous plants with ternate leaves and handsome red Pea-shaped flowers; herbaceous, shrubby, or arboreal in habit. Loam. Cuttings or seeds.

E. Crista-galli has a thick fleshy root-stock which produces annually stout stems 4 to 6 feet high, bearing large red flowers. Brazil.

E. herbacea is a dwarf plant with long arching racemes of red flowers. S. United States.

E. Humeana is a bush 8 to 10 feet high, bearing racemes over a foot long of scarlet flowers. S. Africa.

Eucalyptus.—Australian trees or shrubs. The wood of some is very hard and durable, while from the leaves of others an oil used as a disinfectant is obtained. Some of the 150 species are handsome when young, and a few are worth growing for their flowers. The best for the greenhouse are—

E. calophylla. Upright habit, large ovate leaves; flowers freely in a small state; white.

E. citriodora. Long narrow leaves, very fragrant.

E. cordata. Handsome tree, small glaucous leaves.

E. ficifolia (Red Gum) (fig. 652). Habit of *E. calophylla*; large bright-red flowers.

E. globulus (Blue Gum). Large, glaucous, pendulous leaves; white flowers.

E. Ravenetiana. Pendulous leaves, long and narrow.

Eupatorium.—Shrubby or herbaceous composites with white or purple Ageratum-like flowers. Cuttings in spring; afterwards treated as for Chrysanthemums.

E. atrorubens. Compact habit, large ovate leaves and reddish-purple flowers. Mexico.

E. probum. Compact habit, small leaves, white flowers.

E. riparium. Dwarf, white, free flowering; red stems.

E. trapezoides (*adenophorum*). Tall, with large heads of white flowers.

Eutaxia myrtifolia.—A pretty, yellow-flowered Leguminous shrub from Australia, with small Myrtle-like leaves. Sandy peat.



Fig. 652.—*Eucalyptus ficifolia*.

Fatsia (Aralia).—Ornamental foliage shrubs or small trees. *F. japonica* (*Aralia Sieboldii*) is largely used for house decoration. It produces large terminal panicles of

white flowers in November. There is a form of it with variegated leaves. *F. papyrifera*, the "Rice-paper Tree", is very handsome when planted in a border; it has large gray, lobed leaves nearly 2 feet across. China. Loam.

Ficus.—In addition to *F. elastica*, a general favourite, the following may be grown in the greenhouse:—*F. macrophylla*, with longer and thinner leaves than the former. Australia. *F. stipulata (repens)*, suitable for covering damp walls. Japan and China.

Freesia.—Iridaceous plants with Grass-like leaves and fragrant tubular flowers; useful in the greenhouse, or as cut flowers in winter and spring. From six to nine bulbs should be planted in 5- or 6-inch pots in a compost of loam, leaf-mould, and rotten manure, and placed in a cold frame, no water being given until growth commences. When the flower-spikes show, a little extra warmth may be given. Keep them growing until the leaves show signs of decay, when water must be withheld. They may be flowered two successive years in the same pots. *F. refracta*.—Flower-stems $1\frac{1}{2}$ foot high, branched, and bearing white fragrant flowers with yellow blotches on the lower segments. There are several varieties, *alba* being the best.

Goodia lotifolia is a small Australian loose-habited plant, 3 feet high, with light-yellow flowers in winter. Loam and peat.

Grevillea.—A large Australian genus of Proteaceous trees or shrubs which often have highly ornamental flowers. All are hard-wooded, and require sandy peat.

G. alpina. Small bush, red and white flowers in terminal racemes.

G. Banksii. Small tree, large pinnatifid leaves, dense terminal racemes of bright-red flowers.

G. ericifolia. Heath-like habit, red and yellow flowers.

G. fasciculata. Stiff, upright plant, scarlet and yellow flowers.

G. ilicifolia. Holly-leaved, red flowers.

G. robusta makes a pretty pot plant, with large tripinnate leaves; largely used for table decoration.

Hæmanthus.—Bulbous Amaryllids. Chiefly South African. In many of the species the flowers are produced in advance of the leaves. When growing, plenty of water must be given, reducing the supply as the leaves begin to decay. A decided period of rest is required. At all times they like as much sun as possible. There are a large number of species, of which the following are very showy:—

H. albiflos. Large wide leaves, white flowers with golden stamens. Summer.

H. cinnabarinus. Leaves long, few in number; flowers red, in large dense umbels. Spring.

H. coccineus. Large spreading leaves, red flowers in dense heads. October.

H. Katharinæ. Stem 18 inches, head of leaves; flowers rich-crimson, lateral.

H. multiflorus. Leaves forming a stem a foot long; flowers scarlet with yellow anthers, in large heads.

Hakea.—Hard-wooded Proteaceous shrubs from Australia. About one hundred species are known.

H. dactyloides. Large bush, oblong leaves, small white flowers.

H. pugioniformis. Long needle-like leaves, white flowers.

H. suaveolens. Large bush, pinnatifid leaves, white fragrant flowers.

Hardenbergia.—Climbing plants from Australia with Pea-shaped flowers. *H. Comptoniana* has ternate or five-lobed leaves, and numerous racemes, 3 inches long, of purple flowers in spring; *H. monophylla* has smaller leaves and flowers. Of the latter there are varieties with red and white flowers. Peat and loam. Seeds or cuttings.

Hedychium.—Ornamental plants of the Ginger

family, with rhizomatous root-stock and long narrow leaves on erect stems; flowers in terminal racemes, showy, fragrant. *H. Gardnerianum*, a Himalayan plant, is the most suitable for the greenhouse. It grows from 5 feet high, and bears yellow flowers in wide racemes a foot long. Loam. Division.

Helichrysum (Aphelaxis).—Popularly called "Everlasting Flowers". The indoor sorts are known as Aphelaxis. They are loose-habited shrubs with silvery, scale-like leaves and pink or red-purple flowers. Spring. Sandy peat. Cuttings. The best known are: *H. grandiflorum*, *H. humile*, and *H. sesamoides*.

Heliotropium Peruvianum is the common Heliotrope, of which many varieties are grown. In addition to their usefulness for bedding out-of-doors, they are also useful when grown into pot-shrubs for the greenhouse. Loam.

Hibbertia.—Australian climbing or bushy shrubs with yellow or white flowers, very showy, and of easy culture.

H. dentata has thin twining stems, coppery-red leaves, and yellow flowers $1\frac{1}{2}$ inch across. A perpetual flowerer.

H. Reedii is a Heath-like plant with small yellow flowers.

H. volubilis has green leaves and large yellow flowers. Loam and peat.

Hidalgoa Wercklei (fig. 653).—A herbaceous climber best described as a climbing Dahlia. It grows quickly,



Fig. 653.—Hidalgoa Wercklei.

20 feet or more, and has much-divided, elegant leaves and scarlet flowers 3 inches across. Loam. Cuttings.

Hovea.—Australian shrubs with blue, purple, or violet Pea-shaped flowers. *H. Celsi (elliptica)*, with oval leaves an inch long and numerous deep-blue flowers, and *H. longifolia*, with longer leaves and larger flowers, are worth a place in the greenhouse.

Hoya carnososa is suitable for the greenhouse, and is useful for covering damp walls, the stems being held firmly by aerial roots, as in Ivy.

Humea elegans.—A biennial composite with scented leaves and large erect terminal plumes of gray flowers. Seeds should be sown in sandy soil in July, and the plants grown on throughout winter and spring. In March the stems will begin to elongate, and by July the plumes of flowers, often 8 feet high, will be at their best. They last for several months. Australia.

Hydrangea Hortensia is often treated as an annual in gardens. Cuttings are rooted in autumn, kept in a cold frame all winter, and put into heat in early spring. Flower-buds develop after the fourth pair of leaves, when the plants must be well fed. Heads 9 to 12 inches through may be grown on plants in 5-inch pots. By using iron or coal-dust with the soil a blue shade is imparted to the bracts. Two of the most distinct varieties are: *alba*, pure white, and *Mariesi*, large, red. Japan. *H. petiolaris (scandens)* is a Japanese climber of Ivy-like habit with white flowers, and is good for clothing pillars or walls.

Lochroma.—Tropical American herbs, related to Solanum; leaves ovate, flowers bright-coloured and tubular. Cuttings. Should be stood outside and grown along with Chrysanthemums during summer. They flower in August and September. Loam and manure.

I. coccinea. Long, tubular, scarlet flowers.

I. fuchsoides. Orange-scarlet flowers in pendulous racemes.

I. grandiflora. Blue, should be grown in small pots.

I. lanceolata. Blue, narrower leaves than the preceding.

Ixia.—South African bulbs of easy culture. Should be grown in a sunny house or frame, starting them in October. They require to be rested dry after the foliage withers. The star-shaped flowers, often brilliantly coloured, are borne on elegant scapes well above the leaves. There are many named sorts, including *I. flexuosa*, pink; *I. maculata*, orange; *I. monadelpha*, blue; *I. speciosa*, red; and *I. viridiflora*, green.

Jasminum.—Evergreen or deciduous shrubs, several of which are suitable for the warm greenhouse. *J. gracilimum* from Borneo, with ovate leaves and loose heads of fragrant white flowers, and *J. grandiflorum*, of more bushy habit, are to be recommended; the former for a sunny warm corner of the conservatory. Loam and peat.

Kennedya.—Australian climbers with racemes of Pea-shaped flowers. Loam and peat. Spring.

K. nigricans, black and yellow flowers and ternate leaves; a strong climber.

K. prostrata (Marryattæ), with scarlet flowers, is a beautiful free climber, which forms a screen or curtain if trained along a rafter and the shoots allowed to hang.

K. rubicunda is a strong grower with red flowers.

Lagerstrœmia indica.—A deciduous shrub with the habit of a Privet, and producing large racemes of pink flowers in summer. If planted out in a large sunny house, it is easily managed and flowers freely. After flowering it requires no water until growth recommences in spring. In January all growths should be pruned to within an eye or two of the old wood. There are varieties with white, red, and purple flowers. Loam. Cuttings or seeds. India.

Lantana.—Small bushy soft-wooded plants with heads of red, yellow, orange or white Verbena-like flowers. Propagated by cuttings. Although usually grown to flower in winter, they flower freely at any time. Loam.

Lapageria rosea and its variety *alba* are Chilean climbers with tough, ovate leaves and large tubular, fleshy, pendulous flowers, well known as greenhouse climbers. They succeed in a shaded house, in a mixture of sandy rough peat and charcoal, which should be well drained so

that water may be given freely. *Philageria Veitchii*, raised from *L. rosea* and *Philesia buxifolia*, is an interesting bigeneric hybrid.

Lathyrus splendens, "Pride of California", is a first-rate perennial climber for a sunny greenhouse. It has crimson flowers as large as those of a sweet Pea, in racemes of from three to seven. Loam and peat.

Leptospermum.—Australian Myrtle-like shrubs with starry-white or yellowish flowers. They require sandy peat pressed very firm to induce stunted growth. During summer they must be plunged outside in full sun.



Fig. 654.—*Leptospermum scoparium*.

Of the ten cultivated species, *L. scoparium* (fig. 654), with small leaves and white flowers $\frac{1}{2}$ inch across, and its variety *grandiflorum*, with larger flowers, are the best known.

Libertia formosa and *L. ixioides* are white-flowered Irids, of Iris-like habit, from Australia, New Zealand, and Chili. The flowers are borne well above the foliage in upright panicles. They thrive alike in pots or borders. Loam.

Lippia (Aloysia) citriodora.—The "Scented Verbena" is cultivated largely for its sweet-smelling leaves. The flowers are small and whitish, in large terminal panicles. S. America. Loam. Cuttings.

Lonicera.—One species is useful in the greenhouse, viz. *L. sempervirens*, which produces whorls of scarlet and yellow flowers $1\frac{1}{2}$ inch long, nearly the whole of the year. *L. Hildebrandiana*, from Burma, one of the strongest of indoor climbers, has apricot-coloured flowers 6 inches long, but is a shy flowerer. Loam.

Lotus Bertholetii (peliorrhynchus), a Canary Island species, makes long pendent shoots clothed with linear gray leaves, and bears scarlet flowers 1 inch long. An excellent plant for baskets. Peat.

Luculia gratissima (fig. 655). One of the most showy of greenhouse plants. It forms a large bush 8 to 12 feet high, clothed with oval leaves 6 inches long. The flowers



Fig. 655.—*Luculia gratissima*

are very fragrant, rose-coloured, and are developed in large terminal cymose heads in summer. *L. Pinceana* differs in having white flowers and narrower leaves. Peat and loam. Pot or border. Cuttings.

Lycoris.—Bulbous plants from China and Japan, resembling *Nerines* in habit and requiring much the same treatment. The four species in cultivation are: *L. aurca*, with large umbels of erect golden blossoms; *L. radiata* (*Nerine japonica*), with pink flowers; *L. sanguinea*, with red flowers; and *L. squamigera*, with large bluish-pink flowers. This last is as hardy as *Amaryllis Belladonna*.

Macleana.—*Vaccinium*-like plants of scandent habit. The best known are: *M. pulchra*, from Colombia, with long shoots, leathery oblong leaves, and clusters of scarlet and yellow tubular flowers; *M. punctata*, from Ecuador, has cordate leaves and rosy-red flowers. Peat. Cuttings.

Magnolia.—The following species may be grown in the greenhouse:—

M. Campbelli. Flowers 10 inches across, pale-rose inside, red outside. Deciduous tree. Himalaya.

M. fuscata (*Michelia fuscata*). An evergreen shrub with small purple and yellow fragrant flowers. China.

M. Watsoni. A deciduous bush with large white fragrant flowers. Japan.

Mandevilla suaveolens.—A South American deciduous climber with large white Vinca-like flowers borne in summer. Peat and loam. Border.

Melaleuca.—Australian Myrtles, of which several are ornamental flowering plants. They grow best in a sunny airy position, and prefer a peaty soil.

M. decussata. Bushy; small leaves, lilac flowers.

M. genistifolia. Strong bush; lanceolate leaves, red flowers.

M. Leucadendron (Cajeputi). Large bush; leaves 3 inches long, narrow; flowers white.

M. pulchella. Small bush, small oval leaves, red flowers.

M. styphelioides. Dense bush, small spiny leaves, white flowers.

Mesembryanthemum.—Chiefly South African subshrubby or herbaceous fleshy-leaved plants with conspicuous red, white, or yellow flowers. They delight in a compost similar to that usually given to Cacti, and should be perpetually in full sunshine.

M. blandum. Compact, 1½ foot high, large white flowers.

M. Brownii (fig. 656). A compact bush 1½ foot high, flowers magenta.

M. coccineum. Compact bushy habit, brilliant scarlet flowers.

M. lacernum. Dwarf; thick, triangular leaves; yellow flowers.

M. muricatum. Dense, with small glaucous leaves, flowers red.

M. rhomboideum. Thick, fleshy leaves; yellow flowers.

M. uncinellum. Dense mass, with small glaucous leaves.

Metrosideros.—Evergreen Myrtle-like trees and shrubs with flowers in crowded heads encircling the stem bottle-brush-like, usually white or red. Sandy peat.

M. robusta (*florida*). Leaves oblong glabrous; heads of bright-red flowers.

M. scandens. A scandent shrub which climbs by means of stem-roots. It has small Box-like leaves and white flowers.

M. tomentosa. A large bushy tree with oblong leaves and terminal heads of crimson flowers.

Mimulus glutinosus (*Diplacus*) is worth a place in the greenhouse. It is a small shrub with ovate leaves and salmon-coloured flowers an inch across, produced freely for the greater part of the year. Var. *coccineus* has red flowers. Loam. Cuttings.

Mitraria coccinea, a shrubby Gesneriad from Chili, has small ovate leaves and tubular scarlet flowers an inch



Fig. 656.—*Mesembryanthemum Brownii*.

long, resembling those of *Gesnera*. Peat, or peat and loam. Cuttings.

Monochætum.—*Pleroma*-like shrubs with freely-

borne pretty pink or red flowers. *M. Lemoineanum*, rose-coloured flowers an inch across, and *M. sericeum multiflorum*, with pink flowers and leaves an inch long, are the most common. Peat and loam.



Fig. 657.—*Moræa Robinsoniana*.

Moræa.—Iris-like plants, both in regard to character and cultural requirements.

M. bicolor. Leaves narrow, 2 feet long; flowers white, with a purple blotch at the base of the outer segments. S. Africa.

M. iridioides. White flowers with yellow spots. S. Africa.

M. Robinsoniana (fig. 657). A robust plant from Lord Howe's island. Leaves 6 feet long by 3 inches wide. Flowers on tall branching scapes, white; often fifty to one hundred flowers on one inflorescence.

Musa Basjoo, a Japanese species 12 feet high, with leaves 6 feet long, and *M. Ensete*, from Abyssinia, with leaves 15 feet long by 18 inches wide, are suitable for a large house. They should be planted out if possible, as they will then make handsome specimens.

Myrtus communis, the "Myrtle", with its glossy-green leaves and white fragrant flowers, is useful when grown as a pyramid or standard for the decoration of the corridor. Loam. Cuttings.

M. bullata. Reddish-green, oval, wrinkled leaves. New Zealand.

M. oboordata. An elegant bush with wiry growth and small leaves. New Zealand.

M. Ugni. A dense bush with small leaves, white flowers, and currant-like edible fruit. There is a form with prettily variegated leaves. Chili.

Nandina domestica is an erect bush with slender stems bearing large bipinnate leaves and white flowers in large dense terminal panicles. The young leaves are of a coppery colour, changing to green with age. Loam. Japan.

Nerium Oleander is an evergreen shrub with long

narrow leaves and handsome flowers in large terminal panicles. It grows to a height of 10 feet. There are many varieties with white, pink, red, single or double flowers. Loam. S. Europe.

Olea.—A genus of upwards of thirty species, the best known being the Olive, *O. europæa*, which is a bushy tree with oblong leathery leaves. The flowers are inconspicuous. Loam.

Olearia.—Shrubby composites remarkable for their free-flowering qualities. A few species are hardy, but the majority require greenhouse treatment. Peat and loam. Cuttings.

O. argophylla (Muskwood). Large lanceolate leaves, green above, silvery beneath, with the odour of Musk.

O. compacta. A dwarf compact plant with small leaves, white on the under surface.

O. insignis (fig. 658). A rare New Zealand plant with roundish leathery leaves, green above, white beneath.

O. nitida. A neat, compact, free-flowering shrub with elliptical leaves. New Zealand.

O. stellulata. A neat small-leaved shrub with large heads of starry-white flowers.

Oreopanax.—Handsome-leaved plants resembling *Aralia* and requiring similar treatment. *O. platanifolia*, a South American species with large Plane-like leaves, and *O. sanderiana*, with large three-lobed leathery leaves, from Guatemala, are two of the best.

Oxalis.—Herbaceous plants with short stems, or bulbous or rhizomatous root-stocks. Flowers white, yellow, pink, or red. They thrive in sandy loam in a sunny house or frame.

O. articulata. Trifoliate leaves; pink flowers 1 inch across, in umbels. Argentina.

O. Bowieana. Large trifoliate leaves and large rose-red flowers in umbels. S. Africa.

O. carnosa. Fleshy stems, small leaves, yellow flowers. Chili.

O. crenata. Tall stems, obovate leaflets, yellow flowers. Peru.

O. floribunda. Dwarf free-growing plant with umbels of red or pink flowers.

O. hirta. Dwarf plant, deep-red flowers. S. Africa.

Oxylobium.—Australian evergreen shrubs bearing yellow or orange-red Pea-shaped flowers in dense racemes. Loam and peat.

O. Callistachys. Leaves lanceolate, usually in whorls of three; flowers yellow.

O. ellipticum. Leaves oval; flowers yellow, in dense racemes.

O. lineare. Small leaves, red and yellow flowers in loose racemes.

Passiflora.—"Passion Flowers" should be grown in rich loam and trained on wires a few inches from the glass, allowing the lateral shoots to hang down. As they are rapid growers, frequent thinning is essential, or the branches soon become overcrowded. A few of the most suitable greenhouse species and varieties are—

P. atropurpurea. A hybrid with purple flowers 3 inches wide; the corona violet with white dots.

P. cærulea. White or lilac, with purple corona rays; fruit pendulous, yellow, egg-shaped. Brazil.

P. cærulea-racemosa. A hybrid between the two species, indicated with reddish-purple flowers; very free.

P. edulis (Granadilla). A Brazilian plant with whitish flowers followed by roundish, egg-shaped, purple edible fruit.

P. Munroi. A garden hybrid between *P. alata* and *P. cærulea*. Leaves large; flowers 5 inches across, flesh-coloured, the corona blue.

Patersonia.—Australian Irids with Rush-like leaves and bright-blue fugacious flowers. *P. longiscapa*, with scapes 2 feet long, bearing numerous blue flowers; and

Fig. 658.—*Olearia insignis*.

P. occidentalis, dwarfier in habit, with shorter scapes, are useful, free species. Loam.

Pentapterygium.—Vaccinium-like shrubs with tubular flowers. They are usually found growing in the forks of trees or on fallen stems. A peculiarity they possess is the thick woody base from which the numerous branches spring. They grow well planted out among stones or roots in well-drained sandy peat, or they may be grown in pans.

P. rugosum. A loose-habited bush with ovate-lanceolate leaves and pendulous flowers an inch long borne freely from the old wood; flowers almost white, lined with red.

P. serpens (fig. 659) has long arching branches clothed with small Box-like leaves. From the under side of the previous year's wood and along its whole length, pendulous scarlet flowers an inch long are produced in spring.

Phænocoma prolifera is a small hard-wooded S. African plant very like some species of *Helichrysum*. It has grayish scale-like leaves and terminal heads of crimson flowers. Peat. Cuttings.

Philadelphus mexicanus is not hardy, and is worth a place in the greenhouse. It has large, solitary, nodding white flowers. Loam.

Philesia buxifolia is a dense bush with Box-like leaves and red flowers, smaller than, but in shape like, *Lapageria*. Chili. Peat.

Phormium (New Zealand Flax).—Herbaceous plants with long, tough, Iris-like leaves and inflorescences sometimes 10 feet high; flowers yellow or purplish. They like rich loam and make fine plants when grown in large pots or borders.

P. Cookianum. Arching leaves 5 or 6 feet long.

Fig. 659.—*Pentapterygium serpens*.

P. Hookeri. Leaves 4 to 5 feet long and flower-stalks 6 feet high, flowers purple.

P. tenax. Rigid leaves often 8 feet long, very tough. There are purple and variegated varieties.

Pimelia.—Free-growing compact plants bearing in spring neat, round, terminal heads of pink or white Daphne-like flowers. They are natives of Australia and

New Zealand, and thrive in a cool, airy atmosphere and a compost of peat and loam. Cuttings.

P. ferruginea (decussata). Oblong leaves half an inch long, red flowers in heads an inch across.



Fig. 660.—*Pleroma macranthum*.

P. ligustrina. Ovate leaves an inch long, flowers white in large heads.

P. spectabilis. Long narrow leaves, large heads of white flowers tinged with pink.

Pittosporum.—A large genus of evergreen trees and shrubs, some of which are handsome garden plants. They thrive in peat and loam in pots or borders.

P. crassifolium. Oblong dark-green leaves, white beneath; flowers dark purple. New Zealand.

P. tenuifolium. Neat bush; small green leaves. New Zealand.

P. Tobira. Strong bush; large oval leaves. China and Japan.

P. undulatum. Large bush; oval leaves, white fragrant flowers.

Platytheca galioides (Tetratheca verticillata) is a Heath-like shrub from Australia. It grows about 18 inches high, has small linear leaves, and blue flowers nearly an inch across. Peat. Cuttings.

Pleroma (Tibouchina).—Ornamental shrubs with showy flowers. *P. macranthum* (fig. 660) is a straggling bush suitable for training to the roof of a greenhouse. It has large ovate leaves and purple flowers 4 inches across. Var. *floribundum* has still larger flowers. Brazil. Peat and loam.

Plumbago capensis is a scandent shrub useful for draping pillars. It is rarely out of flower. The type is light-blue, and there is a white-flowered variety. Good also as a screen. S. Africa. *P. rosea* is dwarf, and has rose-coloured flowers. India.

Polygala.—The greenhouse species are hard-wooded plants bearing showy Pea-shaped blossoms. They are easily grown, thriving in a mixture of peat and loam. *P. myrtifolia*, with Myrtle-shaped leaves and purple flowers, var. *grandiflora*, with larger flowers, and *P.*

oppositifolia, with small opposite leaves and purple flowers, are useful.

Protea.—South African evergreen shrubs. The flowers are in round heads surrounded by bracts, which are often very showy. Cool, airy house. Sandy peat.

P. cordata. A low-growing bush with heart-shaped leaves and purple flowers encircled by red bracts.

P. cynaroides (fig. 661). A tall-growing bush with large glabrous leaves and Artichoke-like heads of greenish-white flowers encircled by large rosy bracts.

P. grandiflora. A sturdy plant with large oblong leaves and white flowers.

Pueraria Thunbergiana.—A strong, climbing, Japanese Leguminous plant. Its strong annual shoots sometimes attain 30 feet in length. Leaves large, ternate; flowers large and showy. Loam.

Pultenæa.—Hard-wooded Australian shrubs with small leaves and yellow Pea-shaped flowers. *P. daphnoides*, *P. densifolia*, *P. flava*, and *P. flexilis*, all with small yellow flowers, are worth growing. Peat.

Punica Granatum, the "Pomegranate", is a very ornamental plant, the flowers being conspicuous and scarlet. Two varieties are *flore pleno*, with orange-scarlet flowers 3 inches across, and *nana*, with small flowers but very free. There is also a white variety. Loam.

Ranunculus cortusefolius is worth growing for the greenhouse. It is a Canary Island plant with large leaves, and large heads of flowers on stalks 3 feet high. Loam. Seeds.

Raphiolepis.—Evergreen shrubs with Pyrus-like flowers. *R. indica*, a Chinese plant, has narrow leaves



Fig. 661.—*Protea cynaroides*.

and panicles of white flowers, and *R. ovata*, from Japan, has larger leaves and flowers. Loam.

Reinwardtia.—Related to *Linum*. Dwarf free-flowering pot-plants. *R. tetragyna* (fig. 662), with oval acu-

minate leaves and yellow flowers over an inch across, and *R. trigyna*, similar in habit, but with three instead of four styles. India. Loam and peat.



Fig. 662.—*Reinwardtia tetragyna*.

Rhodochiton *volubile*, the only species, is a climbing Mexican plant with cordate leaves and reddish calyces, with nearly black corollas, freely produced. Loam and peat. Excellent as a screen.

Rubus.—Several species are handsome plants, and serviceable for pillars. Two of the finest are *R. Moluccanus*, the "Himalayan Blackberry", with large handsome leaves and large black fruit in dense clusters, and *R. reflexus*, with smaller hastate leaves and white flowers.

Salvia.—A large genus of herbaceous plants, several of which are useful for the greenhouse. They are of easy culture. Cuttings root readily in spring, or seeds may be sown in February. The young plants should be kept growing, and placed outside in June, feeding them when required. Flowering season, autumn and winter. A few showy species are—

S. azurea. Loose bush 6 feet high; bright-blue flowers in long spikes in great profusion. N. America.

S. coccinea. Bushy plant, long racemes of red flowers. N. America.

S. involucrata, var. *Betnelli*. Good bush, large leaves, reddish-purple flowers.

S. splendens. One of the best of winter-flowering plants for the conservatory. Bushy plant with long racemes of bright-scarlet flowers. Brazil. Of this there are several varieties, var. *grandiflora* being the best. It has very long racemes and large flowers.

Schizanthus.—Chilian annuals, notable for their showy flowers. *S. pinnatus* grows 3 feet high, has small pinnatifid leaves, and lilac or violet flowers. *S. retusus* grows quite as high, and has red flowers.

Senecio.—The "Cineraria" of gardens is said to have originated from *S. cruentus*. All are of easy cultivation, requiring rich loamy soil.

S. cruentus. Biennial, 4 feet high, large leaves; inflorescences 2 feet across, flowers mauve-purple. Canaries.

S. grandifolius (*Ghiesbreghtii*). Tall shrub 10 feet high, large leaves, terminal heads of yellow flowers in winter. Mexico.

S. Heritieri. Bushy plant 3 feet high, whitish leaves, large heads of white flowers, fragrant, edged with pink. Canaries.

S. laxifolius. Like *S. grandifolius*, with rounder leaves and looser heads of flowers. New Zealand.

S. macroglossus (fig. 663), "Cape Ivy". A quick-growing climber with Ivy-like leaves, and sulphur-yellow flowers nearly 2 inches across, produced in winter. Loam. Cuttings. S. Africa.

S. populifolius. An erect plant with roundish leaves white on the under surface, and Daisy-like flowers nearly an inch across, pink and white. Canaries.

Smilax.—Several tender species are useful for draping large pillars or as trailers. Loam.

S. aspera has small hastate leaves, sometimes green sometimes with white spots. S. Europe.

S. australis. An Australian plant with large ovate leaves; very strong grower.

S. macrophylla. Strong grower, with large ovate leaves, green spotted white. E. Indies.

Solanum.—The shrubby or scandent species with Potato-like flowers and often ornamental fruit are useful for the conservatory. Loam. Seeds or cuttings.

S. aviculare, "Kangaroo Apple", 3 feet, entire or pinnatifid leaves, large blue flowers, scarlet fruit.

S. capsicastrum, the "Winter Cherry". A perennial bush 2 feet high, with small green leaves, white flowers, and round or oval, bright-red, Cherry-like fruit. Brazil.



Fig. 663.—*Senecio macroglossus*.

S. jasminoides. Strong climber, small leaves, large pendulous heads of white flowers. Brazil.

S. macrocarpum. Biennial with large spiny leaves and scarlet Tomato-like fruit. Trop. Africa.

S. Melongena, the "Egg Plant". An annual with large leaves

and white, yellow or purple, egg-shaped, edible fruit from 3 to 9 inches long. Tropics, Old World.

S. rostratum. A Mexican species with pretty, finely-cut, grayish leaves and large yellow flowers.



Fig. 664.—*Tecoma Smithii*.

Sparaxis.—South African bulbous plants allied to *Ixia*. They require loamy soil and full sun. Of the numerous species *S. bulbifera*, with small yellow Gladiolus-like flowers; *S. grandiflora*, purple or white; and *S. tricolor*, with numerous varieties varying in colour—white, yellow, brown, or red, may be recommended.

Sparmannia.—A South African shrub with large ornamental leaves and white flowers. Two species are in cultivation, viz. *S. africana*, a large bush with cordate leaves and large heads of white flowers, and *S. palmata*, with smaller leaves and flowers. Loam.

Statice.—The shrubby species from the Canary Islands have large corymbose flower-heads, often blue, scarious, and lasting for two months. Loam, leaf-mould, and manure. There are a large number of species and hybrids in cultivation, of which the following are worthy:—

S. Bourgaei. Dwarf plant with large heads of purple and white flowers.

S. puberula. A much-branched shrub with large leaves, and large heads of blue and white flowers.

S. rosea. A small shrub with small ovate leaves and rose-coloured flowers.

S. profusa, *S. Butcheri*, and *S. macrophylla* are also good greenhouse plants.

Strelitzia.—Leaves large, ovate, on long petioles; flowers brightly coloured. The best known are—

S. Augusta. A tall plant with a thick, woody stem, large Banana-like leaves, and white and blue flowers. S. Africa.

S. Reginae, 3 to 4 feet high, with numerous radical leaves 2 feet long by 7 inches wide. Flowers on long scapes in dense one-sided racemes, orange and blue. S. Africa.

Streptosolen.—Sub-shrubby plants, very like *Browallia*. The only species in cultivation, *S. Jamesoni* from Colombia, makes long scandent shoots, which in spring are clothed with large heads of orange-scarlet flowers. Loam.

Swainsona.—Australian and New Zealand sub-

shrubby plants with pretty Pea-shaped flowers. *S. coronillifolia* makes slender scandent shoots several feet long, with pinnate leaves and long racemes of bright-red flowers. *S. Greyana* has larger leaves and larger pink flowers. Loam and peat. Cuttings.

Tacsonia.—Greenhouse climbers with pendulous bright-coloured flowers similar to those of *Passion-flowers*. Should be planted in a well-drained border of peat and loam, and trained to the rafters of a sunny house. Cuttings.

T. exoniensis. A garden hybrid between *T. Van-Volxemii* and *T. mollissima*.

T. insignis. Leaves simple, ovate; flowers large, crimson, 5 inches across. S. America.

T. manicata (ignea). A strong-growing plant with three-lobed leaves and scarlet flowers. Peru.

T. militaris. A garden hybrid, like *exoniensis*, but has bright carmine-red flowers.

T. mollissima. Large three-lobed leaves; long, tubular, pink flowers 2 inches across. Colombia.

T. Van-Volxemii. A strong-growing, free-flowering plant with showy crimson flowers 5 inches across. Colombia.

Talauma.—Magnolia-like plants suitable for a large conservatory. *T. Hodgsoni*, a Himalayan tree with large oval leaves and large white, fragrant flowers, is suitable for a conservatory.

Tecoma.—Bushy or scandent shrubs useful for draping pillars or rafters. As a rule they do not flower very freely, but *T. capensis* and *T. Smithii* (fig. 664) are often treated as annuals, and flower well. Cuttings are rooted in spring, and the young plants stood in a frame until June, then plunged out-of-doors. One shoot only must be allowed, and in autumn it should have formed a terminal large head of flowers. The first named is scarlet, the latter yellow.

Tetradlea.—Australian Heath-like shrubs requiring sandy peat and a light airy house. *T. hirsuta*, with small leaves and pink flowers, and *T. juncea*, with Rush-like stems and purple flowers, are the best known.

Trachelium cœruleum, though almost hardy, is grown for greenhouse decoration on account of its large loose



Fig. 665.—*Tricuspidaria dependens*.

corymbose heads of small blue flowers. It is a herbaceous plant 2 feet high. Loam. Seeds or cuttings. S. Europe.

Tricuspidaria (Crinodendron) dependens (fig. 665).—

A woody shrub or small tree from Chili. It should be grown in a cool greenhouse, where *Lapageria* thrives. Leaves 3 to 5 inches long; flowers pendulous, over an inch long, fleshy, blood-red; they last a month or more. Peat. Cuttings.

Veronica.—Many of the shrubby species are worth growing in pots for the greenhouse in winter; they can be plunged outside for two-thirds of the year. Rich loamy soil. The two best species for indoors are: *V. Hulkeana*, with small leaves and large loose panicles of lilac flowers; *V. speciosa*, a strong-growing bushy plant with large leaves and upright axillary racemes of blue flowers. Both are from New Zealand. There are very many fine-flowered varieties, of which *Constellation*, pink; *Eclatante*, red; *La Seduisante*, reddish-purple; and *Madame Chretien*, purple, are the best.

Viburnum.—Several species are worthy of greenhouse culture. Two of the best are: *V. macrocephalum*, with very large heads of sterile flowers, and *V. odoratissimum*, with large glossy leaves and flat heads of white flowers; both Chinese. Leaf.

Vitis.—A few evergreen Vines are useful for clothing pillars. *V. antarctica*, the "Kangaroo Vine", is a strong climber with large, dark, ovate leaves. Australia. *V. capreolata* is a strong-growing Indian plant with five-lobed leaves, and *V. hypoglauca* is an Australian plant, also with five-lobed leaves.

Witsenia corymbosa is a shrubby Irid from South Africa. It has erect stems, clothed with small glaucous-green Iris-like leaves, and, in winter, corymbs of bright-blue flowers. Peat. Cool, airy house.

Zephyranthes.—Bulbous American plants belonging to Amaryllideæ, with narrow leaves and Crocus-like flowers. They require sandy loam and a light, sunny position. Numerous species are in cultivation, a selection being—

- Z. Andersoni*. Narrow flat leaves and yellow flowers.
- Z. candida*. Rush-like leaves with large white flowers.
- Z. carinata (robusta)*. Linear flat leaves with large pink flowers.
- Z. rosea*. Like *Z. carinata* but smaller.

CHAPTER XXX.

THE STOVE OR TROPICAL HOUSE.

For the successful cultivation of plants indigenous to hot countries, it is necessary to have one or two houses heated to a temperature congenial to their requirements, and also supplied with other conditions essential to their welfare. Where a selection of plants have to be grown together in one house, they should be such as will thrive under the conditions provided. It is possible to accommodate considerable variety in such a house. Of course it will be understood that to attain perfection in the cultivation of any particular group of plants a special house must be provided, with conditions as to temperature, light, moisture, &c., all carefully adjusted to the peculiar needs of the plants.

An ordinary stove or tropical house, however,

does not differ from a greenhouse, such as is figured at page 202, fig. 262, except in temperature, and at times in atmospheric moisture. The form and internal arrangements are the same, except in the following particulars:—Side-stages, $2\frac{1}{2}$ feet wide, on a level with the wall-plate; in the centre a tan-pit 5 feet wide, the walls, including plate, 3 feet above level of floor; this will allow for a $3\frac{1}{2}$ -feet path all round, betwixt the pit and the side-stages.

Ventilation.—For a hothouse the side-sashes should be fixed, but in the walls below there should be openings 2 feet long by 1 foot wide, fitted with hinged shutters in frames; these openings should be about 9 feet apart. In the roof there ought to be $2\frac{1}{2}$ -feet lights, hinged at the ridge, which also should open with a lever. These arrangements will afford ample ventilation, and the air, which will be principally admitted through the wall-ventilators, will always be in a fit state for the plants, by its having first passed over the pipes.

Heating.—The hot-water pipes should be placed immediately under the stages, and consist of five rows of 4-inch pipes, three flows and two returns; on each side of the house there should be three 9-feet lengths of the pipes with evaporating-troughs cast on them nearly their entire length; these can be filled or otherwise as needed. It is bad economy to provide any plant-house with insufficient heating power. It is not necessary to place hot-water pipes under the centre pit, which should be filled with new tan about the close of the year. With care, this will keep up a heat of 90° for three months, which will not only afford bottom-heat for such plants as may need it, but also assist in maintaining the temperature of the house. In many stoves the central portion is formed of a brick bed 3 feet high filled with clinkers, &c., and surfaced with ashes. This is suitable for the larger plants usually found in stoves, and involves less labour than a tan bed.

A spacious water-tank should be provided, building it, if possible, near the pipes, where it will get warmed. Some cultivators have the tank fixed so that the hot-water pipes pass through it, keeping the water warm and fit for use at all times.

Shade.—There are usually a number of plants that require shading in the summer season, and others that are much better without it. To accommodate both the better way is to shade one end, say half of each, putting together such things as require protection, and leaving the others exposed. In all cases the shading should

LAPAGERIAS

The name *Lapageria* commemorates Josephine Lapagerie, wife of Napoleon Bonaparte, and who took a keen interest in gardening. *L. rosea* was not introduced into European gardens from its home in Chili until 1847, when it was received at Kew. The white variety, *alba*, was received at the Jardin des Plantes, Paris, in 1855. Under cultivation both the red and the white forms have yielded varieties which are superior either in size, form, or depth of colour. The flowers are very durable, and healthy plants produce them almost all the year round. They require a cool shady position in a greenhouse, and peat soil. In south Cornwall they grow and flower freely against a wall in the open air.



LAPAGERIA:—
1, ROSEA. 2, ROSEA ALBA.

be of a movable character, to run up and down as required, upon rollers fixed in the usual way. There can be no greater mistake in our sunless climate than to have fixed shading that remains on whether required or not, to the continual exclusion of light.

The cooler or intermediate house should be constructed in every way similar to that already described for plants requiring tropical heat, with the exception that three or at most four rows of 4-inch pipes round it will be sufficient; the central bed and general arrangement should be the same, not omitting the water-tank.

Temperature.—Plants from distinctly tropical regions are all the year round subject to a high temperature. The differences that affect them in a state of nature are generally the change from hot and dry to hot and moist, although they may never be under the influence of drought either in the air or at the roots. Plants from countries where such climatic conditions as these exist will not bear a low temperature. The small amount of light we get through the winter as compared with that in tropical countries, necessitates an enforced rest during winter for many plants which would otherwise grow. Again, in hot countries a temperature in the air of say 90° is no more oppressive to man than one of 75° in a close house. This, no doubt, is owing to the confined state of the air, and we may suppose it exerts a like influence upon plants. A temperature of 70° by artificial heat in a plant structure will force growth equal to what would take place in the open air at a temperature 10° higher, under equal conditions of moisture in the atmosphere and at the root; consequently it is neither necessary nor desirable, especially in the winter months, to maintain in our plant-stoves as much heat as the occupants are subject to in a wild state.

On the other hand, a low temperature must be avoided. Too long a rest in the winter is bad for many plants. In most hot countries the dormant season for vegetation is short, and under cultivation eight or ten weeks is quite sufficient for any plant to remain in a dormant state.

The warmest house should be kept at 65° by night, but in very cold weather 5° lower is safe, and on the whole better. During the day 5° to 10° higher may be maintained. In February a few degrees more may be given if the light is favourable and the outside temperature mild, too free a use of fire-heat exercising an injurious influence upon growth; towards the end of April

the temperature should be 65° or 70° at night, and 10° higher by day, especially if the sun has any power. It must be understood that these temperatures are advised for thoroughly good light houses, with the plants kept up to the glass and well managed in every way, with plenty of room, otherwise their growth will be weakly. From May onwards the temperature may be kept at about 70° at night, or higher, if the fires are not needed, whilst during the day it may rise to 90° with sun. Plants thus treated have a very considerable start over those that are kept in a dormant condition until the spring is advanced; and they therefore have a longer growing season, finishing in good time to ripen and set for flowers. By the end of August growth will be finished, and the plants should be treated in a manner calculated to ripen them. This is done by reducing the atmospheric moisture by the admission of more air with less shading, but not by the reduction of temperature until the ripening process is nearly complete. In November and December the night-temperature should be kept at from 65° to 60°.

In the intermediate house the temperatures day and night should range about 10° lower than those given above, both in summer and winter.

Soils.—Stove plants as a rule are not so particular as to soil as are greenhouse plants, nevertheless there are many that thrive only when planted in specially prepared soil. As a rule, strong growers that are naturally not possessed of a free disposition to flower will, if grown in peat, produce wood rather than bloom, a flowering condition being more favoured by a loamy soil. Their generally free growth and abundance of foliage, calculated to evaporate moisture rapidly, involving the application of large quantities of water to the soil, make a thoroughly porous condition necessary, and this is ensured by a liberal use of sand, peat, and loam of a fibrous nature, and good drainage.

Potting.—The plants should be repotted when the roots begin to work freely in the spring, and many free-rooting things will require a second shift during the summer. There are a few stove plants, such as Allamanda and Bougainvillea, that are benefited by the use of a little decayed manure, but generally it should not be mixed in the soil, manure-water, which is quick in its action, being preferable. With few exceptions, stove plants do not require to be potted so firmly as those that grow in a lower temperature.

Training, Pruning, &c.—Serious mistakes may be made in the training of stove plants, especially such as are of a climbing or twining habit. All plants that have a natural disposition to upright growth, and that flower from the extremities of the shoots, should never be trained until their blooms are set, after which they can be put into the required shape. As to training in general, it is well to be guided by the habit of the plant; such as are naturally spreading are less likely to be in any way injured by being trained in a bush-like form. The greater number of plants that are grown in heat may be freely cut back a little before active growth commences. Plants thus treated should be kept close and a few degrees warmer to induce a vigorous break. When the new growths are half an inch or so long the plants may be shaken out and repotted into new soil.

Firing and Air-giving.—In the cultivation of stove plants a good deal depends upon judicious firing, especially in the spring. In March and April the sun is often very hot when cold cutting winds prevail; and if the fires are not stopped sufficiently early in the morning full advantage of the sunlight and heat cannot be taken, as it necessitates either too much shading or the admission of air to keep down the temperature, which is injurious to the young tender foliage, and crippled leaves, stunted growth, and the certain appearance of red spider are the consequences. As the season advances, and the difference between the external air and that in the house is less, more air may be given, never, however, in such quantities as to dry the atmosphere too much.

Watering and Syringing.—A volume might be written on this subject, so many plants requiring different treatment in respect to moisture. The condition of a plant, the size of the pot it occupies, the time of year, must all be taken into account. Morning is the best time to give water to the roots, and the whole collection should be examined daily. Syringing, when required, should be always done sufficiently early in the afternoon to admit of the leaves getting moderately dry before darkness sets in, as wet foliage with a falling temperature is not good for plants. If possible, the syringing should be done immediately before the house is closed, and so as to catch a little sun-heat, the condition to be aimed at being, say, a rise of temperature 10° through closing, when the syringing does most good. Manure-water should only be given when the pots are filled with roots.

Insects.—It is difficult to keep a mixed collection of stove plants clean, the conditions being so favourable to the rapid increase of all kinds of insect pests. Mealy-bug, white and brown scale, thrips, aphides, red spider, and ants are ever at work, and must have no quarter. The best time to attack them is in the autumn, when the wood and leaves are matured, and able to bear whatever insecticides are used. The whole collection should be gone over periodically. It is only by perseverance that anything like cleanliness can be arrived at. If plants get very bad, it often pays to burn them and start afresh.

CHAPTER XXXI.

LIST OF STOVE PLANTS.

In addition to the plants dealt with specially in the chapter on "Popular Garden Plants", there are a very large number of others in general cultivation that require stove treatment.



Fig. 666.—*Acalypha Sanderi*.

The following selection includes both flowering and foliage plants:—

ACALYPHA.—Most of the species are compact shrubs with variegated leaves; of these *A. Chantrieri*, *A. Godsefiana*, *A. marginata*, and *A. Willinekii* are the best. *A. hispida* (*Sanderi*) (fig. 666) is a robust shrub with large cordate green leaves and numerous axillary tail-like tassels of bright-crimson flowers.

ACHIMENES. See p. 400.

ÆCHMEA.—Compact-growing plants related to the Pine-Apple. Loam or peat. Suckers. *Æ. fulgens* produces handsome spikes of scarlet and black flowers in July or August. *Æ. Mariæ Reginæ* is a larger grower, with very handsome rosy bracts in April and May. *Æ. Lalindei*, crimson bracts, forming a fine plant. *Æ. Lindeni*, yellow flowers with red bracts. *Æ. Veitchii*, scarlet flowers and bracts.

ÆSCHYNANTHUS.—Free-growing plants of moderate growth, producing handsome flowers from the points of the shoots. Peat. Cuttings. *Æ. Lobbiana* is a dwarf drooping plant, with pretty scarlet blooms set in purple



Fig. 667.—*Æschynanthus speciosus*.

cup-like calyces; suitable for a hanging basket. Spring. *Æ. speciosa* (fig. 667) is a stronger grower, of more upright habit, bearing large terminal bunches of bright-red flowers. Summer and autumn.

ALLAMANDA.—Large, vigorous, strong-growing, summer-flowering climbers, suitable for draping a roof, or to train as pot specimens. Loam. Cuttings. *A. Hendersoni* is very free, producing enormous yellow blooms. *A. grandiflora* is a smaller, more compact-habited plant than the last, with pale-yellow flowers. *A. nobilis* is a strong grower, with large, handsome, pale-yellow blooms; one of the best. *A. Williamsii* is a dwarf, compact, free-flowering variety. *A. violacea* has purple flowers.

ALOCASIA.—A large genus of tropical Aroids, the leaves of some attaining considerable dimensions; they thrive in a humid atmosphere, and require shade. Peat and loam. Division, suckers, or offsets. *A. Chelsoni* and *A. Sedeni* are garden hybrids, with bronzy-green leaves, with white veins, reddish-purple beneath. *A. illustris* has large bright-green leaves, marked with patches of dark-olive. *A. Lowii*, leaves on stout stalks, large and of a beautiful deep-green, with ivory-white midrib and veins. *A. macrorrhiza variegata* is of large growth, with

stout stem and leaf-stalks, pale-green in colour, striped with white; leaves very large, pale-green and pure-white in about equal proportions, dispersed over the surface in broad irregular blotches. *A. metallica*, leaves large, shield-like, smooth, and shining, the colour deep olive-green, suffused with bronzy-red above, and underneath reddish-brown. *A. Sanderiana*, leaves long and sinuous in outline, deep-green, midribs and margins white; *gundavensis* is a magenta-tinted form of this. *A. Thibautiana*, foliage very large and handsome, olive-green, with gray ribs. *A. Veitchii* is in the way of *A. Lowii*, green, with a metallic shade like polished steel. *A. Watsoniana*, one of the largest, leaves a yard in diameter, olive-green with darker veins, purplish beneath; *A. spectabilis* is very similar to this. *A. zebrina*, leaves handsome, large, and arrow-shaped, stout foot-stalks, which are pale-green, banded with dark-olive.

ALPINIA *vittata*.—Stems a yard high, bearing lance-shaped leaves, pale-green in colour, striped with creamy white. Loam. Division.

AMASONIA *calycina (punicea)* is an erect shrub, with lanceolate green leaves, and terminal spikes of yellow flowers with conspicuous crimson leafy bracts. Loam and peat. Cuttings.

AMHERSTIA *nobilis*.—A most magnificent tree Legume, bearing in spring large racemes of vermilion and golden-yellow flowers; requires plenty of head-room in a hot, moist, shaded house. Loam. Cuttings.

AMORPHOPHALLUS *campanulatus* is worth growing for the sake of its large umbrella-like leaf and mottled stalk. It has a large fleshy tuber which pushes up a huge purple-brown flower of extraordinary form and disagreeable odour. Should be rested in winter. Prefers plenty of heat and moisture. Other species sometimes grown are *A. virosus* and *A. Titanum*; the latter, of truly titanic proportions, may be seen at Kew.

ANANASSA *sativa variegata*.—A variegated form of the Pine-Apple, green and creamy-white, tinged with red in about equal proportions. Loam. Suckers. *A. Porteana* is another form of it.

ANTHURIUM *Scherzerianum*.—A brilliant, scarlet-flowered Aroid, of compact habit, lasting long in bloom; *album* is a pretty white-flowered variety. *A. Rothschildianum* is a cross between the red and white forms; its flowers are generally white, mottled with red. *A. Lindeni*, a tall, sturdy plant, has cordate leaves and large white spathes. *A. Andreanum*, a scandent species, has heart-shaped leaves and very large wrinkled blood-red spathes with curled yellow spadices. Many hybrid forms have been raised from the two last-named, some with large white, pink, or deep-crimson spathes. *A. magnificum*, *A. Warocqueanum*, and *A. crystallinum* are beautiful foliage plants. *A. Veitchii*, a very handsome species, has leaves 3 to 4 feet long, deep-green, the nerves arched and deeply sunk, giving them a very distinct appearance. Peat loam and sphagnum. Seeds and division.

APHELANDRA.—Of somewhat spare erect habit, with little disposition to branch. Peat. Cuttings or seeds. *A. tetragona* produces in autumn large upright spikes of deep-orange-coloured flowers. *A. Roelii* has deep-green shining leaves and fine heads of bright-red flowers. *A. pectinata* and *A. squarrosa* are also good winter-flowering shrubs. *A. variegata* has leaves handsomely marked with pale-yellow.

ARALIA.—Handsome shrubs, with elegant foliage, related to the Ivy. Peat and loam. *A. Guilfoylei*, pinnate leaves, serrated on the edge, and margined with white. *A. reticulata* has long narrow leaves, prettily veined. *A. elegantissima* has palmate leaves, with serrated leaflets. *A. Veitchii* is of very slender habit, with elegant palmate



Fig. 668.—*Ataccia cristata*.

foliage; *gracillima* is a form with very narrow leaflets, and is an elegant plant. *A. Chabrieri* has leaves a foot long, deep-green, with crimson midrib. *A. Kerchoviana*, a very elegant species with digitate deep-green leaves. *A. leptophylla*, dark-green, finely-cut, slightly pendent leaves. Cuttings or grafts.

ARAUJIA.—A genus of climbers, with hairy, ovate leaves and axillary Stephanotis-like clusters of creamy-white fragrant flowers. *A. grandiflora* and *A. sericifera* are the best. Loam. Cuttings.

ARDISIA crenulata.—Small and erect in habit, bearing quantities of bright-red berries that hang long upon the plant; the flowers, which are inconspicuous, are white; *alba* is a white-berried form. Loam. Seeds and cuttings.

ARISTOLOCHIA.—Mostly strong-growing climbers, producing large, very singular-shaped flowers in summer; and requiring a considerable amount of room. Peat or loam. Cuttings. *A. Gigas Sturtevantii* has very large flowers, creamy-white and brown. *A. ornithocephala* has smaller blooms, of a yellow and brown colour. *A. Goldiana*, flowers very large, greenish out side, internally yellow, with chocolate veins. *A. elegans*, a handsome species, rich maroon-purple internally, marked with white lines. *A. ridicula*, flowers with ear-like lobes, purplish-brown, with whitish veins.

ASPIDISTRA lurida.—A few pots of this should be in every stove collection, as it is most useful for general furnishing purposes.

ATACCIA cristata (fig. 668).—Large, ovate, wrinkled leaves, like a gigantic Plantain, with tall, graceful spikes of Cat-head-like flowers coloured brown-purple. Fibrous peat. Division.

BEAUMONTIA grandiflora (fig. 669).—A vigorous climber, with leathery, ovate, green leaves, and axillary clusters of large trumpet-shaped white flowers, produced in spring; must be kept dry all winter. Loam. Cuttings.

BEGONIA. See p. 411.

BERTOLONIA.—Dwarf plants, a few inches in height, the leaves prettily marked with small round coloured spots. *B. superbissima* has leaves olive-green, spotted with reddish-pink. *B. Van Houttei* has leaves veined and spotted with carmine in the most beautiful manner. *B. margaritacea superba*, *B. guttata*, and *B. punctatissima rosea* are distinct and handsome. Cuttings or seeds.

BIGNONIA.—Free-growing climbers. Peat. Cuttings. *B. regalis*, yellow and red, very handsome. *B. magnifica*, mauve and reddish-purple. *B. Chamberlaynii*, long racemes of yellow flowers. *B. venusta* is similar in habit to the last, with orange blooms. *B. speciosa*, pale-purple, *B. purpurea*, rose-purple, and *B. Cherere*, orange-red.

BILLBERGIA.—Pine-Apple-like plants, with tall spikes of usually bright-coloured flowers and large, conspicuous bracts. There are many species, of which *B. Bakeri*, *B. Liboniana*, *B. nutans*, *B. Porteana*, *B. pyramidalis*, *B. speciosa*, *B. thyrsoides*, *B. vittata*, and *B. zebrina* are the best. There are also numerous garden hybrids, *B. Breautiana* (fig. 670) being one of the best of

these; it is a cross between *B. vittata* and *B. Bakeri*; the flowers are white and blue, and the large bracts rich red. Peat. Suckers.

BOUGAINVILLEA.—Strong, free-growing, profuse-flowering plants, suitable for draping pillars or to grow as pot



Fig. 669.—*Beaumontia grandiflora*.

specimens, their highly-coloured bracts producing a gorgeous effect. Loam or peat. Cuttings. *B. glabra* is the freest, colour rosy-mauve. *B. Sanderiana* is a very free-flowering form, with mauve bracts. *B. spectabilis* is a stronger grower, with large deep-mauve flower-bracts.

BROWNEA.—Tall plants, suitable only for large houses. They have large pinnate leaves and globose head of bright-red flowers. *B. coccinea*, *B. Crawfordii*, *B. grandiceps*, and *B. macrophylla* are the best. Loam. Cuttings.

BRUNFELSIA (Francisceae).—Shrubs with leathery leaves

and flat Achimenes-like flowers, usually purple or blue. Loam and peat. Cuttings. *B. Americana*, *B. calycina* (including numerous garden forms named *augusta*, *eximea*, *macrantha*, *violacea*, &c.), *B. latifolia*, and *B. nitida* are the best. May be grown in pots or planted out in a border.

BURBIDGEA nitida.—A handsome perennial, allied to the Ginger, growing to a height of 2 or 3 feet, producing bright orange-scarlet flowers. Grows very freely in loam, peat, and leaf-mould.

BURCHELLIA capensis.—A handsome bushy plant, in habit not unlike an *Ixora*; it is a free-grower, bearing



Fig. 670.—Billbergia Breautiana.

from the points of the shoots moderate-sized bunches of scarlet flowers in spring. Peat. Cuttings.

CALADIUM. See p. 414.

CALATHEA.—Often confused with *Maranta*, but distinguished by its short globose flower-heads. Many of the species are cultivated for their prettily variegated foliage. The best of these are *C. argyrophylla*, *C. eximea*, *C. illustris*, *C. fasciata*, *C. leopardina*, *C. Lindeniana*, *C. medio-picta*, *C. princeps*, *C. Sanderiana*, *C. Veitchiana*, and *C. zebrina*. Division.

CARAGUATA.—A genus of Bromeliads, with elegant smooth foliage and central pyramidal heads of bright-red flowers. *C. Andreana*, *C. cardinalis*, *C. conifera*, *C. Melinonis*, *C. Morreniana*, and *C. Zahni* are the best. Suckers.

CISSUS (now included in *Vitis*), free-growing climbers, suitable for covering a wall or trellis. Loam. Cuttings. *C. discolor* has velvety-purplish leaves, marbled with white, and shaded with pink. *C. argentea* has leaves handsomely marked with silvery-gray. *C. porphyrophyllus*, with purplish-coloured leaves, is a species of Pepper.

CLERODENDRON.—Shrubby plants, others of twining habit; all good growers and free-flowering. Loam. Cuttings and seeds. *C. fallax* has spreading ample foliage, and large panicles of bright-scarlet blooms. *C. fragrans* is moderate in growth, and has white flowers tinged with

red. *C. Thomsonae* (*Balfourii*) is suitable either for a pillar, rafter, or as a trained pot specimen; flowers deep-red, with pure-white calyces produced in the greatest profusion, and lasting for several weeks during the summer. *C. splendens* is of similar habit, but has rich-crimson flowers. *C. speciosum* is a hybrid between these two.

CLIVIA. See p. 428.

COCHLIOSTEMA Jacobianum.—A broad-leaved, spreading, dense-habited plant, in appearance not unlike a *Billbergia*, and bearing through the summer, from the base of almost every leaf, large panicles of azure-blue flowers. Peat. Suckers.

COLUMNEA scandens.—Of spreading habit, bearing freely during the summer numerous tube-shaped scarlet flowers. Sandy peat. Cuttings.

COMBRETUM purpureum is a handsome evergreen climber of moderate growth, producing large racemes of intense purplish-crimson flowers in July. Peat. Cuttings.

COSSIGNIA borbonica.—An elegant hard-wooded plant, attaining a considerable size; the imparipinnate leaves green, with orange-coloured veins. Peat. Cuttings.

COSTUS.—Several species are worth growing, especially *C. igneus*, which has stems a foot high, round, fleshy, hairy leaves, and large, flat, golden-orange flowers. Division.

CRINUM.—A large genus of bulbous plants, chiefly tropical. They require plenty of light at all times, and should be watered freely whilst growing, afterwards resting them for two or three months. The best for garden purposes are *C. amabile*, *C. asiaticum variegatum*, *C. Augustum*, *C. brachynema*, *C. giganteum*, *C. latifolium*, *C. Sanderianum*, and *C. zeylanicum*. They prefer well-drained loamy soil. Seeds and offsets.

CROSSANDRA undulatifolia is a dwarf, shrubby Acanthad, with shining green leaves and terminal racemes of salmon-red flowers. Cuttings. Autumn.

CROTON. See under *Codiaeum*, p. 429.

CUPANIA filicifolia.—A hard-wooded upright-growing plant, with fern-like leaves of most elegant habit. Peat.

CURCULIGO recurvata variegata.—A broad-leaved grass-like plant a yard high, the leaves plaited, gracefully curved, green striped with white. Loam. Division.

CURCUMA Roscoeana.—A low-growing, deciduous, herbaceous plant, with ample foliage, and spikes of scarlet bracts and yellow flowers that stand for weeks in the summer. Peat. Division.

CYANOPHYLLUM magnificum.—A noble plant with immense velvety-ribbed leaves, rich olive-green on the upper side, the under surface pale-red. Peat and loam. Cuttings.

DALECHAMPIA Roeliana.—A free-growing plant of dwarf, bushy habit. The flowers are subtended by large pale-pink bracts, produced in May and June. Peat or loam. Cuttings or seeds.

DESMODIUM gyrans.—The "Telegraph Plant"; a slender, erect herb 2 feet high; the leaves are continually in motion, the foot-stalks being hinged at their junction with the stem. Loam. Seeds.

DICHORISANDRA musaica.—A dwarf herbaceous plant with dark-green reticulated leaves, purple beneath. There are several species with tall stems and prettily variegated leaves, viz. *D. vittata*, *D. Sieberi*, &c. Peat. Cuttings.

DIEFFENBACHIA.—"Dumb-Cane". Stems stout, succulent; leaves large, spreading, of a very ornamental character. Loam. Cuttings. The best sorts are *D. Boumanni*, *D. Baraguiniana*, *D. brasiliensis*, *D. Carderi*, *D. grandis*, *D. illustris*, *D. Jenmani*, *D. Leopoldi*, *D. nobilis*, *D. picta* (*Bausei*), *D. Weiri superba*, *D. Memoria-Corti*, *D. robusta*.

DIPLADENIA.—Twining plants, suitable for rafters or as trained pot specimens, flowering freely all through the

summer. Fibrous peat. Cuttings. *D. Brearleyana* is a fine garden hybrid, free, the flowers rich-crimson. *D. amabilis*, also a garden hybrid, has flowers of a purplish-



Fig. 671.—*Dipladenia atropurpurea*.

crimson colour. *D. splendens*, flowers delicate bluish, with a deep rose-coloured throat. *D. crassinoda*, lovely rose-scented flowers. *D. boliviensis*, white, with deep-yellow throat, very free; *D. atropurpurea* (fig. 671), short growth, small leaves, flowers crimson-purple; *D. eximia*, *D. illustris*, *D. Sanderi*, *D. splendens*, and *D. speciosa* are other good sorts.

DRACENA. See p. 437.

ECHITES *nutans*.—A twiner, related to Dipladenia, with leaves of a pale pea-green, the midrib and nerves veined with transparent red. Peat. Cuttings.

EPISCEA (*Cyrtodeira*).—A small genus of herbaceous trailers with handsome foliage and bright-red flowers. Will grow in any shady moist corner. Useful also for baskets. *E. chontalensis*, *E. fulgida*, and *E. maculata* are the best.

ERANTHEMUM.—A useful genus of stove Acanthads, flowering in winter. They are easily managed, and free and pretty in flower. Ordinary soil. Cuttings in spring. The best are *E. Andersoni*, *E. cinnabarinum*, *E. igneum*, and *E. nervosum* (*pulchellum*). Several species are grown for their variegated leaves, i.e. *E. atropurpureum*, *E. Cooperi*, *E. leuconeuron*, *E. maculatum*, *E. reticulatum*, and *E. tricolor*.

ERYTHRINA.—A large genus of tropical shrubs and trees, with pinnate, deciduous leaves, and large racemes of bright-scarlet flowers. *E. Humeana* is worth a place in large stoves. *E. Parcelli* and *E. mar-morata* are grown for their variegated foliage. Loam.

EUCHARIS. See p. 442.

EUPHORBIA *jacquinieflora* (*fulgens*) has long, slender,

erect shoots, with elegant Willow-like foliage; flowers intense scarlet, produced in clusters in the leaf-axils in winter. *E. splendens* is a stout-growing, dense-habited spiny plant that produces all the year round small bunches of bright-scarlet flowers.

EXACUM *zeylanicum* is a shrubby Gentian, with stems 18 inches high, opposite ovate leaves, and terminal clusters of large rich purple-blue flowers with yellow anthers. Peat and leaf-soil. Cuttings or seeds. Prefers shade.

FICUS.—The "India-Rubber", *F. elastica*, is well known as a valuable decorative plant. A form of it called *variegata* is freely variegated with cream-colour. *F. nympha-folia* has large green heart-shaped leaves. *F. repens*, *F. minima*, *F. radicans*, both green and variegated, and *F. falcata* are small self-clinging trailers, useful for covering walls, &c. *F. Canoni* (*Artocarpus*) has bronzy-purple leaves. Loam. Cuttings.

FITTONIA.—Pretty free-growing trailers. *F. Pearcei* and *F. Verschaffeltii* have dark-green leaves with red reticulations; *F. argyroneura* is green with white reticulations. Suitable for a basket or vase. Peat. Cuttings.

GARDENIA.—Useful shrubs with deep shining green leaves, and mostly creamy-white, highly fragrant flowers. Peat. Cuttings. *G. florida* and its varieties *Fortunei* and *radicans* are well known. They may be had in flower all the year by using a succession of plants. *G. Stanleyana* (*Randia maculata*) (fig. 672) is of spreading habit, with long-tubed white maroon-spotted flowers produced in May from the axils of the young leaves.

GESNERA.—Tuberous-rooted summer-flowering plants, of dwarf growth, the leaves as well as the flowers of some kinds being remarkably handsome. They require the same



Fig. 672.—*Gardenia Stanleyana*.

treatment as Gloxinia. Cuttings or seeds. *G. cardinalis* (*macrantha*) dwarf, large green leaves, bright-crimson long-tubed flowers. *G. Cooperii* has flowers of an intense

scarlet. *G. Donklarii* is similar in habit to the last-named, but the blooms are deep-crimson. *G. exoniensis* has deep-orange flowers, produced in large panicles from the crown of the shoots; the leaves are broad, and have the appearance of silk plush. *G. refulgens*, rich dark-red. *G. nageloides*, pink flushed with red; of this there are numerous garden varieties, such as *bicolor*, *candida*, *corallina*, &c. *G. Leopoldii*, velvety leaves, crimson and brown flowers.

GLORIOSA (*Methonica*).—Tuberous-rooted plants of climbing habit, bearing Lily-like flowers, with narrow reflexed petals, of a golden-yellow and red colour. Summer. *G. virescens* (*Plantii*) and *G. superba* are the two species grown. Loam.

GLOXINIA. See p. 446.

GOSSYPIUM.—A few Cotton plants are worth a place in a stove. They are raised from seeds sown in spring, the plants being treated liberally in regard to heat and moisture until they show their Hibiscus-like flowers, when they should be placed in an airy house for a few weeks to mature their Apple-like pods. When these burst and reveal the mass of cotton surrounding the seeds they are interesting and instructive. *G. arboreum*, *G. herbaceum*, and *G. barbadense* are the three principal species. Loam.

GRIFFINIA.—Low-growing evergreen bulbous plants, with ovate green foliage, from the base of which spring erect, stout stems, bearing umbels of distinct and beautiful lilac and white flowers. *G. Blumenavia* and *G. hyacinthina* are in cultivation. They require the same treatment as *Eucharis*. Autumn. Loam. Offsets.

HEMANTHUS.—African bulbous plants, with fleshy, green leaves and usually large drum-stick-like flower-heads. They like a long rest from water in a dry, sunny place. The following are stove species:—*H. carneus*, bright-pink; *H. cinnabarinus*, bright-red; *H. Katherineæ*, very handsome heads of bright-scarlet flowers; *H. magnificus*, and its varieties *insignis* and *superbus*; *H. multiflorus* (*Kalbreyeri*), and *H. Lindeni*, both very attractive deciduous species, with bright-crimson flower-heads. Offsets. Loam and peat.

HELICONIA.—Several beautiful foliage-plants are in cultivation as Heliconias, but are quite distinct from the true plants of that name. They like light, rich soil, plenty of water and heat. Division. *H. aureo-striata*, green, with yellow reticulations, 4 feet; *H. illustris*, almost wholly glowing-crimson, 3 feet; *H. spectabilis*, rich bronzy-green, 5 feet. *H. psittacorum* is a true Heliconia, with spoon-shaped green leaves and orange and crimson flower-bracts.

HEXACENTRIS (*Thunbergia*) *mysorensis* (fig. 673).—A robust climber, with drooping clusters of beautiful red and yellow flowers. Summer. Peat and loam. Cuttings.

HIBISCUS.—Free-growing plants, of vigorous habit. Loam. Cuttings. *H. rosa-sinensis* has large deep-scarlet flowers; var. *puniceus* is compact in habit, with very double, intense crimson flowers; var. *Callerii*, very distinct; var. *fulgidus*, rich deep-red; var. *zebrinus*, striped; var. *flavus*, yellow; var. *metallicus*, bronzy leaves; var. *Cooperi*, leaves prettily variegated. *H. Archeri* is a hybrid between *rosa-sinensis* and *schizopetalus*, and exactly intermediate in character. *H. Manihot* is a robust shrub, with large lobed leaves, and enormous primrose-yellow flowers with a large eye-like blotch of maroon. *H. schizopetalus* is in the way of *H. rosa-sinensis*, but with long-stalked, drooping flowers, very elegant.

HIPPEASTRUM. See p. 447.

HOYA.—Most of these are twining plants, producing handsome wax-like flowers on short persistent axillary stalks. Peat. Cuttings. *H. carnosa* is as free as Ivy,

and flowers profusely in any moist, shady corner. *H. imperialis* has ample, thick, leathery leaves and large straw-coloured flowers borne in large bunches. *H. bella* is a slender, small-leaved plant, of drooping habit, bearing lovely balls of flowers, white, with pink centre, and is best grown in a basket. *H. Paxtoni* is a form of it. *H. multiflora* (*Centrostemma*) is a compact little shrub, with bunches of straw-yellow flowers.

HYMENOCALLIS.—A genus of easily-grown bulbous plants, requiring rich loam, leaf-mould, and sand. *H. fragrans* has handsome fragrant, pure-white flowers. *H. macrostephana*, a large vigorous grower, has long, arching leaves and great heads of pure-white flowers,

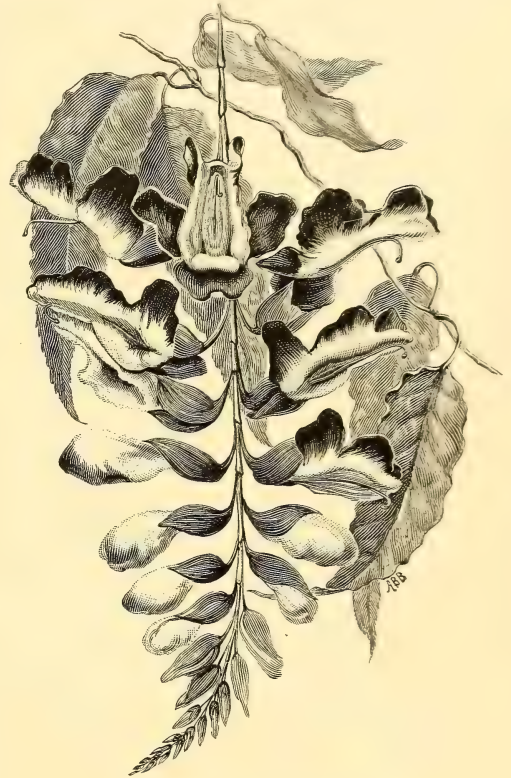


Fig. 673.—*Hexacentris mysorensis*.

which are fragrant and highly decorative. *H. speciosa* has pure-white flowers, which are very showy and sweet-scented in the evening. *H. littoralis* has narrow leaves and tall scapes of elegant white, fragrant flowers.

IMPATIENS.—Free-growing herbs with pretty flowers, the best being *I. auricoma*, with yellow flowers; *I. Hawkeri*, a robust grower, with large, bright-red flowers; and *I. Marianæ*, with silvery variegated foliage. *I. Sultanii*, scarlet, flowers freely and continuously, and is a most useful stove annual. *I. platypetala* and the variety *alba* are equally valuable.

IPOMÆA.—Summer-flowering twiners, suitable for training over a path, where their flowers are seen to advantage; they are free in growth. Sandy loam. Cuttings and seeds. *I. Learii* is a strong grower, requiring plenty of room; the flowers large, trumpet-shaped, deep-blue. *I. Horsfalliæ* has large clusters of beautiful rose-crimson blossoms, produced in autumn; var. *Briggsii* has smaller flowers coloured cerise. *I. ternata* (*Thomsoniana*) is like the last-named, but has larger leaves and white flowers. Some of the

annual species are worth growing in the stove, especially *I. Bona-nox*, with very large white flowers, open at night; *I. rubro-cerulea* and *I. Quamoclit*.

IXORA.—Gorgeous-flowered evergreen shrubs of compact bushy habit. Cuttings. Peat and loam, and require



Fig. 674.—*Jasminum gracillimum*.

plenty of heat. *I. coccinea* has heads of bright-scarlet flowers. The following are garden forms of it:—*Dixiana*, orange; *Fraseri*, bright-scarlet; *grandiflora*, incarnata, flesh-coloured; *lutea*, yellow; *Pilgrimi*, orange-scarlet; and *Westii*, compact, with rounded corymbs of bright-red flowers. *I. macrothyrsa* (*Duffii*) has heads of crimson flowers nearly a foot across; the shoots of this should not be stopped, as when they grow to a length of 3 to 5 feet they produce enormous flower-heads. *I. javanica* is of more slender habit, with paler green foliage, and bright orange flowers in June and July. *I. salicifolia* has narrow lance-shaped leaves and orange-coloured flowers.

JACOBINIA.—Free-growing shrubby Acanthads. Cuttings in early spring. Loam and leaf-mould. The best sorts are *J. chrysostephana*, yellow; *J. coccinea*, red; *J. magnifica*, and its varieties *carnea* and *Pohlana*. These plants are also known as Justiceas.

JACQUEMONTIA *violacea*.—A low-growing trailing Convolvulus-like plant, slender in habit, producing freely blue funnel-shaped flowers. Summer. Loam. Cuttings.

JASMINUM.—Some of the tropical species are worth a place in the stove. The best are *J. gracillimum* (fig. 674), of scandent habit, with compact heads of attractive, white, fragrant flowers; *J. Sambac flore-pleno*, of straggling habit, its white fragrant flowers produced from the points of the young shoots all the year round.

KEMPFERIA (including *Cienkowskia*).—Ginger-like plants, variable in foliage, some being prettily variegated. Light soil. Division. *K. Kirkii* has racemes of flowers resembling *Mitonia vexillaria*. *K. Ethelia* has larger flowers than *K. Kirkii*. *K. Roscoeana* has beautiful bracts and yellow flowers.

KARATAS (*Nidularium*).—Pine-Apple-like plants, some of which are distinct and handsome in flower. Loam. Suckers. *K. fulgens* produces from the centre a head of deep-red flowers. *K. Laurentii*, flowers blue. *K. Legrellæ*, flowers purple and white, bracts rose-tinted. *K. spectabilis*, a truly handsome species, leaves tipped with red, flowers bluish and white.

LAGERSTROMIA (fig. 675).—Tall, Privet-like, deciduous shrubs, with large panicles of elegant flowers, produced in July. Should be grown in a sunny position, and kept dry in winter. The shoots should be cut back after flowering. *L. indica*, the Crêpe-Myrtle, has bright-pink flowers; var. *alba* has white flowers, and var. *elegans* crimson. Loam. Cuttings.

LEEA.—Pinnate-leaved plants related to Vitis. Several species are grown as pot-shrubs in large plant-houses, for which they are adapted. The best of these are *L. coccinea* and *L. sambucina*. One of the prettiest of stove foliage-plants is *L. amabilis*, with the habit of a sapling Elder and leaves of a rich purple-brown colour, margined and lined with white. Loam. Cuttings.

MANETTIA.—A small genus of slender climbers, with thin shoots and axillary flowers. Light loam. Cuttings. *M. cordifolia* has thin cordate leaves, and tubular red flowers; *M. luteo-rubra* (*bicolor*) has ovate thick leaves, and urn-shaped scarlet and yellow tubular flowers. They grow best on a trellis or small pillar.

MARANTA.—Often confused with Calathea, from which it differs in its zigzag stems and small unattractive flowers. Some of the Calatheas are known in gardens as Marantas. *M. arundinacea*, the Arrowroot, is typical; the plant known as *Phrynium variegatum* being merely a variegated form of it. Other species worth growing for their foliage are *M. amabilis*, *M. bicolor*, and its



Fig. 675.—*Lagerstrœmia indica*.

varieties *Devosiana*, *Kerchovæana*, *Makoyana*, and *Mas-sangeana*, *M. musaica*, and *M. Sagoreana*. The plant grown as *M. major* belongs to the genus *Ischnosiphon*. It has erect, elegant, green leaves, and is very useful for

decoration. They all like light rich soil, plenty of heat and moisture, and shade. Division.

MARCGRAVIA.—A genus of Ivy-like habit, with two kinds of growth, the juvenile stage having ovate leaves and clinging closely exactly as Ivy does, whilst the mature stage has lanceolate leaves and does not cling. *M. umbellata* (*dubia*) is an excellent plant for clothing a wall or pillar. Loam. Cuttings. The plant grown in gardens as *M. paradoxa* is *Monstera tenuis*, an Aroid.

MARICA.—Flag-like plants, thriving in a shady, moist position, useful for furnishing out-of-the-way places. *M. cærulea*, blue and gold, *M. gracilis* and *M. Northiana*, yellow and purple, are the best. Division.

MEDINILLA.—Strong-growing shrubs, with usually broad, leathery leaves, and bunches of handsome flowers. Loam. Cuttings. *M. magnifica* (fig. 676) bears rosy-pink



Fig. 676.—*Medinilla magnifica*.

flowers in large drooping panicles in May. *M. amabilis* is similar in growth and flowers, but has erect instead of drooping panicles. *M. Curtisii* is a smaller species, with pendulous branchlets, producing clusters of pretty ivory-white flowers.

MIMOSA *pudica*, the "Sensitive plant", should be raised annually from seeds and grown on singly in 4-inch pots. It is most sensitive when grown in a hot, moist, rather shaded position. Loam.

MONSTERA *deliciosa* (*Tornelia fragrans*).—A strong-growing Aroid, with stout, fleshy, scandent stems, from which are borne large leathery heart-shaped leaves, with numerous slit-like perforations. The spathe is 8 inches long, fleshy, white, and boat-shaped. The long cone-like spadix is edible. Loam. Cuttings. *M. tenuis* (*Marcgravia paradoxa*) has clinging stems and ovate leaves until it gets to a considerable height, when the leaves are much larger and pinnate. It is an excellent wall-plant.

MUSA.—Some of the species are worth growing in large houses for the sake of their noble foliage. *M. sapientum*, the Banana, of which there are many varieties with most

delicious fruits, should be grown both for its leaves and fruits. Some of the forms have stems 9 to 12 inches in diameter, and grow 20 to 25 feet high. *M. Cavendishiana* has stems about 6 feet high, and sometimes produces clusters of fruit weighing over half a cwt. *M. coccinea*, *M. rosea*, and *M. rubra* are smaller species with erect flower-spikes clothed with large bright-red or rose-coloured bracts; *M. superba* is a bulbous-stemmed deciduous species about 6 feet high; *M. Ensete* has a short stem, and leaves from 15 to 20 feet long; it does best in a cool house. *M. vittata* has variegated leaves; *M. sumatrana* and *M. zebрина* have bands of brown-purple on their leaves. They all like a well-manured loamy soil. Suckers or seeds.

MUSSËNDA *frondosa*.—A low spreading bush, bearing on the points of the young shoots bunches of small yellow flowers, encircled by large white bracts, which give it a singular and pleasing appearance. May and June. Loam. Cuttings.

NEPENTHES. See p. 477.

OXERA *pulchella*.—A vigorous climber, with the habit of *Clerodendron Thomsonæ*, and large panicles of tubular white flowers. Should have a sunny position to flower well. Loam. Cuttings.

PANAX.—Aralia-like plants, with herbaceous usually crisped foliage. Most of the species form elegant little pot-shrubs. Loam and peat. Cuttings. *P. cochleatum*, *P. crispatum*, *P. fruticosum*, and its varieties *Guilfoylei* (Aralia) and *Victoriæ*; *P. elegans*, and *P. Mastersianum* are in cultivation.

PANDANUS.—The Screw-Pines when small are useful for general decoration, and when room can be afforded they are noble plants when large. They are easily grown, and most of them produce offsets freely. They like a rich soil and plenty of water. *P. graminifolius* is dwarf, branching freely horizontally, the leaves narrow and grass-like; *P. inermis*, also known as *amaryllidifolius*, has green spineless leaves, a variegated form of it is called *Baptistii*; *P. discolor*, bronzy-green; *P. javanicus*, silvery and green, very spiny; *P. pacificus*, short, broad, bright-green leaves; *P. Sanderi*, a most decorative plant, the leaves green with broad stripes of cream-yellow; *P. utilis*, green with dark-brown margins; *P. Veitchii*, the most popular of all, elegant in habit, green, with stripes of white.

PANICUM *plicatum*.—A handsome grassy-leaved plant, useful for furnishing. *P. variegatum* (*Oplismenus Burmannii*) is an elegant plant with white and pink striped leaves.

PASSIFLORA.—A large genus of most useful climbers, of easy culture, and usually very free-flowering. Suitable for draping pillars, roofs, walls, &c. They should be planted out if possible. In early spring the shoots should be cut back to spurs, and the whole plant thoroughly cleaned, as they are much subject to bug. The best tropical sorts are:—*P. alata*, large entire leaves, and fleshy-pink and purple flowers, succeeded by large edible fruits; *P. Bellottii* and *P. Buonaparteæ* are not unlike the last, being hybrids between it and *P. quadrangularis*; *P. cærulea* does well in a warm house; *P. edulis*, the "Granadilla", worth growing for its delicious purple Plum-like fruits; *P. Jenmani*, yellow-flowered; *P. kewensis*, a hybrid between *cærulea* and *Raddiana*; *P. macrocarpa*, like the first-named, but with fruits as large as a Melon; *P. racemosa* (*princeps*) (fig. 677), pendent racemes of bright-scarlet flowers; *P. Raddiana* (*Kermesina*), one of the prettiest, the flowers bright-crimson and purple; *P. trifasciata*, remarkable for its velvety variegated leaves; *P. Watsoniana*,

not unlike *P. Raddiana*, but with lilac-purple flowers, deliciously fragrant.

PAULLINIA thalictrifolia.—A graceful little scandent



Fig. 677.—*Passiflora racemosa*.

shrub, with thin stems bearing numerous leaves as elegantly divided as *Adiantum cuneatum*. It may be grown on a small trellis or pillar, or if kept pinched in, it forms an elegant pot-shrub. Loam and peat. Cuttings.

PAVETTA borbonica.—A beautiful erect-growing plant, with long stout shining leaves, the ground colour pale-green, mottled with blackish-green; midrib pale-red. Peat. Cuttings.

PELLIONIA.—A small genus of the Nettle family, but the relationship is evident only in the flowers, the stems being trailing, and the leaves ovate, fleshy, smooth, and prettily marked with gray and metallic-green. *P. Daveauana* and *P. pulchra* are worth a place in any stove. Cuttings.

PENTAS carnea.—A soft-wooded shrub of low spreading habit, free-growing, and producing abundant corymbs of pretty lavender-coloured flowers at any time of year. Loam. Cuttings.

PEPEROMIA argyrea.—A dwarf soft-wooded plant, with circular or ovate fleshy leaves, coloured bright-green blended with silvery-gray. Peat. Cuttings.

PHILODENDRON.—Aroids of trailing or scandent habit, some of them with very large foliage, others small and variegated. Excellent for clothing pillars and walls in large houses, or for draping stems or rafters. The best are *P. Andreanum* (fig. 678), *P. Corsianum*, pale-green and bronze; *P. Carderi* (verrucosum), *P. crinitum* (squami-ferum), *P. erubescens*, *P. gloriosum*, *P. lacinosum* (quercifolium), *P. Mamei*, *P. Martineti*, *P. ornatum*, *P. Selloum*, and *P. Wallisii*. They like shade, plenty of moisture and heat. Some of them have large handsome flowers.

PHYLLANTHUS.—Pinnate-leaved shrubs which produce their small white or reddish flowers along the margins of the leaflets. There are many species, all easy to grow in an ordinary stove. The best are *P. angustifolius*, with long leaflets coloured dark-green; *P. epiphyllanthus* (falcatus), leaflets lanceolate, rather rigid; *P. latifolius*, leaflets ovate, leathery; *P. pulcher* (*Reidia glaucescens*), leaves herbaceous, pale-green; and *P. nivosus*, leaves glaucous-green. Cuttings.

PHYLLOTENIUM, or *Xanthosoma Lindenii*, is like an *Alocasia*, but has thicker sagittate leaves, bright-green, with broad silvery bands along the midrib and veins. It likes plenty of heat and moisture and an open peaty soil.

PITCAIRNEA.—A large genus of Bromeliaceæ with tufted foliage, usually long and grass-like, and long, arching, branched scapes of red, white, or yellow tubular flowers. Peat and leaf-mould. Seeds or division. Some of the best species are *P. albiflos*, *P. angustifolia*, *P. aphelandraeflora*, *P. corallina*, *P. maidifolia*, *P. muscosa*, *P. recurvata*, *P. Roelzii*, *P. staminea*, and *P. xanthocalyc.*

PLUMBAGO rosea.—An erect slender grower, with large leaves; the flowers, in erect panicles, of a deep rose-red colour, produced in winter; very free. The variety *superba* has deeper-coloured flowers. *P. capensis* and the variety *alba* are also useful in the stove. Loam. Cuttings.

POINSETTIA. See p. 489.

POSOQUERIA.—Shrubs, related to *Gardenia*. They have ovate fleshy leaves, and terminal clusters of handsome tubular white flowers. *P. latifolia* (*macrophylla*) is worth a place in a roomy stove. Loam. Cuttings.



Fig. 678.—*Philodendron Andreanum*.

RONDELETIA speciosa.—A compact, small-leaved bush, bearing bright-red bunches of *Verbena*-like flowers in June, and lasting two months. Peat and loam. Cuttings.

ROUPALA (*Rhopala*).—Distinct and handsome stove plants. Fibrous loam and peat. Cuttings. *R. elegans*, *R. Pohlîi* (*aurea* and *corcovadensis*), and *R. Vervaineana*



Fig. 679.—*Saintpaulia ionantha*.

all have the habit and foliage of an Ash-sapling, but they are covered with soft hairs, and coloured dark-green and brown. Useful either as pot-plants, or as large planted-out specimens.

ROUPELIA grata, the "Cream Fruit", is a robust scandent shrub, with fleshy, ovate, dark-green leaves, and large Stephanotis-like clusters of bell-shaped waxy-looking, purple and white flowers. It should be grown on a rafter in a sunny position, and in strong loamy soil. Cuttings.

RUSSELLIA.—Elegant scandent little plants, the branches suggestive of the Mare's-tail (*Equisetum*). The leaves are small, and the tubular bright-red flowers are borne profusely all over the plant. Most suitable for a basket or pillar. *R. juncea* and *R. sarmentosa* are the two species, and from these a race of pretty hybrids have been raised by M. Lemoine; they are named *elegantissima*, *Lemoinei*, &c.

SAINTPAULIA ionantha (fig. 679).—A delightful little Gesneriad, with the habit of a Violet. It forms rosettes of spoon-shaped, fleshy, dark-green leaves, and produces clusters of short-tubed, purple-blue flowers in great profusion; there is a variety with white flowers. May be grown in any position almost, even in the gravel on the stages.

SANCHEZIA nobilis.—A stout branching bush, easily grown and very handsome; leaves deep-green, midrib and veins bright yellow. Flowers tubular, rich yellow. Loam. Cuttings.

SANSEVIERIA.—Singular-looking plants, their leaves, which spring from a stout rhizome, being either cylindrical, keeled, or strap-shaped, and marked zebra-like with gray and green. They yield excellent fibre. The best for decoration are *S. cylindrica*, leaves a yard long and tough as india-rubber; *S. guineensis* (*javanica*) has flat erect leaves 2 to 4 feet high; *S. Kirkii* has thick channelled leaves, said to be 6 feet or more long in the tropics; *S. zeylanica* has keeled leaves.

SARACA (*Jonesia*).—A genus of tree-like Legumes, not unlike *Brownea* in habit and foliage, but the scarlet and orange flowers are borne in crowded axillary clusters, and are rather like *Ixoras*. They require plenty of room. The best are *S. cauliflora*, *S. indica*, and the hybrid *S. Crawfordii*. Loam. Cuttings.

SCUTELLARIA.—Quick-growing herbaceous plants which may be utilized as winter flowerers. They form shapely specimens with a little stopping of the shoots, and they always flower freely. *S. coccinea*, *S. Mociniana*, and *S. Ventenatii*, all scarlet-flowered, should be in every stove collection. Light loam and leaf-mould. Cuttings.

SOLANDRA grandiflora is a very robust scandent plant, with fleshy branches and leaves, and large tubular white flowers, not unlike those of a *Datura*, changing to cream-yellow with age. An excellent plant for a sunny position on a rafter or pillar in a large house. Cuttings.

SOLANUM.—Several scandent tropical species are useful climbers for a warm house. The best of them, and certainly also one of the very best climbers grown, is *S. Wendlandii* (fig. 680), which has fleshy stems, pinnatifid leaves, and enormous terminal clusters of bright blue-purple flowers. It blooms all summer in a sunny position in a warm house, if planted out. *S. Seaforthianum* and *S. pensile* are also free-flowering climbers of elegant character. Loam. Cuttings.

SONERILA.—Small herbaceous plants, with ovate leaves more or less spotted with silvery-white on a bright-green ground. They are excellent for baskets or pans. When well grown they produce bright-pink flowers abundantly. *S. margaritacea* and *S. maculata* are the two species, and from these several well-marked seedlings have been raised. Peat. Cuttings.

SPATHIPHYLLUM.—Elegant Aroids related to *Anthurium*. They have long-stalked oblong green leaves, and tall slender scapes, bearing white spathes in some species, green in others. They like the same treatment as *Anthurium*. The best are *S. blandum*, *S. candidum*, *S. cannaefolium*, *S. Patini*, and *S. pictum* (variegated).



Fig. 680.—*Solanum Wendlandii*.

SPHÆROGYNE latifolia.—A *Melastoma* related to *Cyanophyllum*, with magnificent deep-green velvety-ribbed leaves, in opposite pairs. Peat and loam. Cuttings.

STEPHANOTIS floribunda.—A robust twiner, with deep-green ovate foliage of leathery substance, from the axils of which the tubular, white fragrant flowers are borne freely in large bunches. Loam and peat. Cuttings.

STRELITZIA reginae.—A stately-growing plant, with large, spoon-shaped, green leaves, and tall scapes of yellow and blue flowers issuing from a boat-shaped sheath; var. *citrina* has lemon-yellow flowers. *S. Augusta* and *S. Nicolai* are tall-stemmed Musa-like plants, fit only for large houses. Loam. Division.

STREPTOCARPUS. See p. 516.

STROBILANTHES.—Several species of this genus of shrubby Acanthads are worth growing for their blue tubular flowers, and *S. gossypinus* has attractive velvety foliage. *S. Dyerianus* is remarkable for the rich colour assumed by its foliage, especially during youth and when in vigorous condition, the leaves, which are nearly a foot long, being coloured rich steel-blue, purple, and magenta. It is best when grown in a hot, moist, shaded position. Cuttings. Any light soil.

TABERNEMONTANA coronaria flore-pleno.—A Gardenia-like shrub of medium size and free-growing habit; the flowers, which are double and pearly-white, are borne on the points of the young shoots in July. Peat and loam. Cuttings.

THEOPHRASTA imperialis.—A large stately-growing plant, with a stout erect stem, from which proceed immense oblong, glossy-green undulated leaves, armed with strong spines on the edge. Loam.

THUNBERGIA.—Vigorous twining plants that require a good deal of room. Loam. Cuttings. *T. grandiflora* produces in the summer a succession of large racemes of large pale-blue flowers; var. *alba* has milk-white flowers. *T. laurifolia* (Harrisii) is similar. *T. alata*, with its handsome black-eyed buff flowers, is a free-flowering stove annual. *T. affinis*, a more shrubby plant, with purplish-violet flowers with yellow throat, and *T. (Meyenia) erecta*, with its variety *alba*, are useful pot-plants, and form shapely little shrubs.

THYSACANTHUS rutilans.—An erect, rather leggy plant, with lanceolate leaves, and in winter numerous elegant, long, drooping panicles of bright-crimson tubular flowers. Loam. Cuttings.

TIBOUCHINA (*Melastoma* and *Pleroma*).—Handsome shrubs of easy cultivation, requiring liberal root-space, a light soil, and plenty of water whilst growing. They are attractive even when not in flower. They produce their large, flat, purple-blue flowers in autumn and winter. The best are *T. Benthumiana*, *T. elegans*, *T. heteromalla*, and *T. semidecandra*.

TILLANDSIA (including *Vriesia*).—A large genus of Bromeliaceæ, comprising plants of very varied size and habit, from *T. Regina*, of the dimensions of the American Aloe, to the pigmy *T. ionantha*, which might be hidden in a Walnut shell. The Spanish Moss or Old-Man's Beard, *T. usneoides*, is another extreme form. Some species never develop roots, their duties being apparently performed by the leaves. Peat and leaf-mould. Suckers and seeds. The following have handsome flowers: *T. cardinalis*, *T. corallina*, *T. Devansayana*, *T. Duvaliana*, *T. gloriosa*, *T. hieroglyphica*, *T. Lindeni* (fig. 681), var. *minor*, *T. psittacina*, *T. Poelmani*, *T. Rex*, *T. splendens* (*zebrina*), *T. tessellata*, and *T. Vigersii*.

TORENIA.—A genus of herbaceous trailers, which are best raised from seeds in early spring and treated as recommended for Achimenes. They are useful for edging borders or to furnish the front of stages. Also excellent basket plants. The sorts grown are *T. asiatica*, blue and

purple; *T. Fournieri*, blue and purple; and *T. flava* (*Bailoni*), yellow.

TOXICOPHLEA (*Acokanthera*) *spectabilis*.—A sturdy evergreen shrub, which may be grown on a pillar; the flowers, which are white, very fragrant, and clustered, are produced from the points of the shoots and in the axils of the leaves in winter. Loam. Cuttings.

URCEOLINA aurea.—A small bulbous plant related to *Eucharis*, but with smaller foliage than *E. grandiflora*,



Fig. 681.—*Tillandsia Lindeni*.

and scapes 6 to 9 inches high, bearing umbels of pendulous yellow and green urn-shaped flowers. When the leaves wither the bulbs should be rested on a dry shelf. *Urcecharis Clibrani* is a hybrid between this and *Eucharis grandiflora*. Peat and loam.

UTRICULARIA.—Remarkable little herbaceous plants, the roots of some of them bearing bladders which are utilized to trap insects as a source of food. They have strap-shaped, ovate, or peltate leaves, and erect spikes of flowers. They all like to be grown in wet moss in shade. *U. Endresii* has rosy-purple flowers an inch across; *U. ionantha*, *U. longifolia* (*Forgetiana*), and *U. nelumbifolia*, bright-blue flowers, and *U. montana*, white flowers. The last-named is the easiest to cultivate.

VINCA rosea.—A free-growing herbaceous plant, about a foot high, bearing all through the summer from the points of the shoots pretty red-eyed flowers. The variety *alba* has white flowers. Loam. Cuttings.

WORMIA Burbidgei.—A robust shrub, with erect, woody stems, bearing large, flat, glossy-green leaves, and axillary racemes of large bright-yellow flowers suggestive of those of St. John's Wort. The base of the young leaf clasps the stem in a peculiar manner. Loam. Cuttings.

CHAPTER XXXII.

ORCHIDS.

GENERAL REMARKS—HOUSES—TREATMENT—HYBRIDS—
PRUNING—MANURE—INSECTS—CUT FLOWERS—
SPOT OR DISEASE—LIST OF ORCHIDS.

Orchids are generally supposed to be difficult to cultivate; they are, however, with some exceptions, much easier to manage than some other classes of plants, in proof of which statement it is only necessary to point to the collections of Orchids which may be found in the worst parts of many of our cities, and in places where scarcely anything else would grow. It is thought by many that only a professional Orchid-grower can manage Orchids successfully, but any intelligent gardener who gives his mind to the subject will soon acquire the necessary skill and knowledge to enable him to compete successfully with the specialist.

Orchids were formerly supposed to require great heat, and that supposition did much to prevent their becoming popular, those who essayed their cultivation being disheartened by the failure of many of the plants to thrive; hence the belief that they were difficult to grow. Experience has taught that temperate treatment generally is most congenial to the majority of garden Orchids, whilst even those from the most tropical regions thrive in an ordinary stove temperature.

Where excessively high temperatures are employed the damage is done chiefly in what ought to be the resting season, all Orchids requiring a rest, *i.e.* a reduced allowance of water and a lower temperature for a time, the length of time varying according to the nature of the species. The differences on this point are most important.

Much mischief has resulted from the belief that Orchids were plants requiring similar although a special kind of treatment. As a matter of fact, they constitute one of the largest sections of the vegetable kingdom, the different members of which in many cases require as widely different treatment as that necessary for the Pelargonium and the Stephanotis, the Cape Heath and the tropical Aroid. At the same time a selection of Orchids may be successfully grown along with other plants, even where but one house is provided, if care is exercised to select such plants as require similar treatment in a general way, and such as the accommodation afforded is likely to suit, treating each Orchid

in all the operations according to its special requirements.

Whilst the culture of Orchids requires a little extra forethought and careful attention to details, in respect of watering, resting, cleanliness, temperatures, shade, ventilation, &c., common sense enters largely into their treatment, as it does in most other garden operations, and those who apply it will find Orchid cultivation as devoid of difficulties as that of any other garden plants.

It will be well to briefly glance at the native habitats of the species composing some of the larger genera in order to perceive the importance of a knowledge of the cultural requirements of each. Of *Odontoglossums*, those that require the lowest temperature, and of which *O. crispum* and *O. Pescatorei* are typical, are most abundant in the mountainous regions of the South American Andes, between Bogota and Ocana, at an altitude varying from 5000 to 9000 feet, a humid temperate region with a mean annual temperature of a little over 55° for the higher elevation and 65° for the lower. The differences between the maximum and minimum temperatures sometimes are very great, the thermometer in the heat of the day often rising to 90°, falling at night to 40°. From this fact may be deduced the importance, first, of a low night temperature, and secondly, that an occasionally high temperature in summer need not cause anxiety if the house is carefully shaded and ventilated, and the atmosphere kept moist.

Still following the mountain ranges of South America, we find in Costa Rica *Odontoglossum Krameri*, *O. coronarium*, *O. Schlieperianum*, and others, which require a little more warmth in winter than the *O. crispum* section. Then in Guatemala, between 10° and 15° N. lat., *O. pulchellum*, *O. Uroskinneri*, and *O. grande*, and 5° farther north the Mexican *O. bictoniense*, *O. nebulosum*, *O. cordatum*, *O. maculatum*, *O. Rossii*, *O. Cervantesii*, &c., occur. These prefer a slightly drier air than the species from the South American continent, the upland plains and slopes which they inhabit being invariably swept by gentle breezes. *Miltonia vexillaria* and *M. Roezlii* inhabit the central and western slopes of the Western Cordillera of South America at the low elevation of 1000 to 2000 feet, which indicates that under cultivation they require greater warmth in winter.

A study of the conditions under which the *Cattleyas* and *Lælias* occur in nature will show why the majority of the species, although from districts so widely separated, may easily be

cultivated under the same conditions. They come from the higher and cooler parts of the countries they inhabit; the Mexican *Lælias* (*L. anceps*, &c.) from 6000 feet to 8500 feet elevation, with an average mean temperature of 50° to 70°; the Colombian *Cattleya Trianae*, *C. Mendelii*, &c., from 2000 feet to 5000 feet altitude, where they get full sun and a high temperature by day, falling to about 50° at night. This occurrence of a night temperature much lower than that of the day is general, and in the treatment of Orchids under cultivation

it should also be followed. The altitude at which a plant occurs in a wild state, especially those which inhabit tropical regions, is important to the cultivator, a knowledge of it often making all the difference between success and failure. As a case in point may be mentioned the little scarlet-flowered *Lælia monophylla*, which, known only as a native of Jamaica, was kept in a hothouse, where it invariably failed; but on its being ascertained that it was found wild only in the mountains at an altitude of 5000 feet, where Filmy Ferns

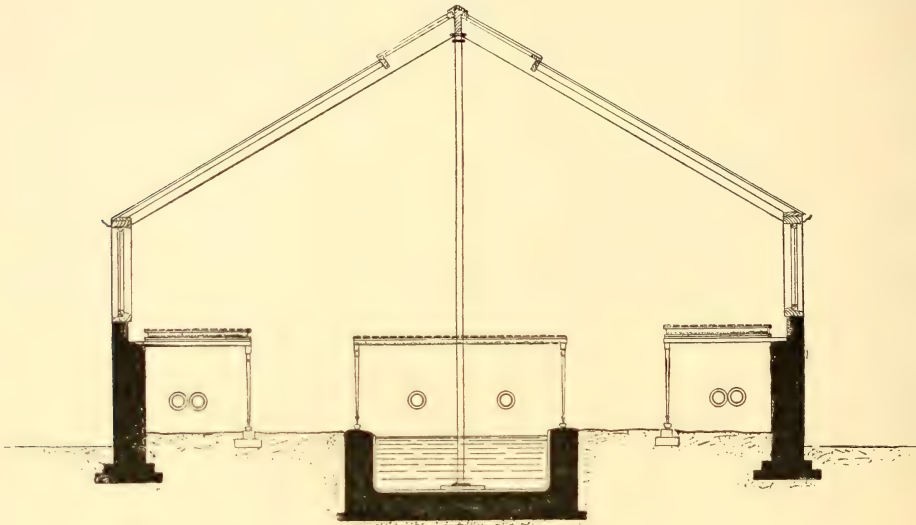


Fig. 682.—Intermediate Orchid House.

were its companions, it was grown in a cool house with success.

The distribution of the large and variable genus *Dendrobium* may be taken as another example. It is found in most countries in tropical Asia, including India, the Malay Archipelago, the islands of the Western Pacific, and also in Australia, a few also being natives of Japan and New Zealand. The name *Dendrobium* conveys nothing as to the cultural requirements of the plants, but a knowledge of the conditions and temperature under which each species occurs affords a safe guide to its cultivation. By separating them into three or four groups, according to the temperature and rest they require, no difficulty is found in the cultivation of the majority of the species.

Houses for Orchids.—Although it is not necessary to build houses specially for Orchids, where gardening under glass to any extent is carried on, where it is intended to grow a large collection, or a considerable quantity sufficient to fill one or more houses, it is better to devote houses

exclusively to them, either by converting already existing structures or by building new ones. If old, the house should be thoroughly cleaned, and the arrangements for ventilation, staging, and other details be in accordance with the directions here given.

Span-roofed houses facing east and west have preference, as they allow of the greatest amount of light reaching the plants; but if any other aspect is more suitable or convenient, that matter need not stand in the way. If it is intended to build a house of one compartment, it is better to arrange and heat it as an intermediate house (fig. 682); but if the collection to be grown is likely to be extensive and of a general character, it will be better at once to provide three houses or divisions, so that the three temperatures necessary may be available. For this purpose a span-roofed range, from 60 to 100 feet in length, with two glass partitions dividing it into three compartments, will be found to answer. The width may be from 10 to 18 feet, and the height to the top of the span

8 to 10 feet. The brickwork of the house should be carried up to the level of the stage, and above that the sides should be of fixed glass, not movable to act as ventilators, as air admitted on a level with the plants is not good for Orchids. Ventilation from below should be provided by openings in the brickwork just above the ground-line, so that the air enters beneath the stages. These openings should be about 18 inches in length and 6 or 9 inches in height, and be placed about 9 feet apart on both sides of the house. These should be the principal means of ventilation, top ventilators being used only to allow of the egress of bad air, for it should be remembered that even the laps of the glass supply some top ventilation. The openings should be fitted with sliding traps or covers, so that the admission of air may be easily regulated. The top ventilators should be at the highest point in the roof, and may be made in whatever may be thought the most simple and convenient way. Usually small sashes are provided, which may be opened to the desired extent either by cords or by some mechanical arrangement. Beyond these it is well to provide a small ventilator at each end of the roof at the highest point. The inside of the roof should have stout wires stretched from end to end at intervals, to provide accommodation for suspending the plants grown in baskets and pans. Provision should also be made over the sides of the walks and other places where plants may be suspended, to prevent the water from dripping from them on to the plants beneath. Should the suspended plants be numerous and directly over the stages occupied by other plants, they should be taken down to be watered, and allowed to drain before being returned. Drip, whether it be from plants overhead or from the roof of the house, is very injurious to Orchids; and seeing this, it is advisable in constructing the house to prevent condensed moisture from dripping from the rafters and sash-bars, by having them grooved, or by fastening strips of zinc to the under sides of the sash-bars for that purpose.

Heating.—For a single structure intended as an intermediate house, three rows of 4-inch piping extending round the house will be ample. If three houses or divisions are provided, they should be arranged as East Indian or warm house, Brazilian or intermediate house, and cool or *Odontoglossum* house respectively. The division next the boiler should be warmest; and as it is in all cases best to have a good command of heat, it should have four rows of

4-inch piping on each side. The intermediate division will require three rows, and the cool one two rows. Stop-valves should be fixed in the pipes to control the heat in each division. Pipes to supply bottom-heat, or for heating water-tanks, are not required. The hot-water boiler should be so fixed that there is no possibility of sulphurous fumes passing from the furnace or chimney into the house; it should never be set in a stoke-hole under the house, but outside and clear of it.

Cool Orchid House (fig. 683).—Some amateurs elect to grow cool-house Orchids only, and for their model they may take the cool-house span-

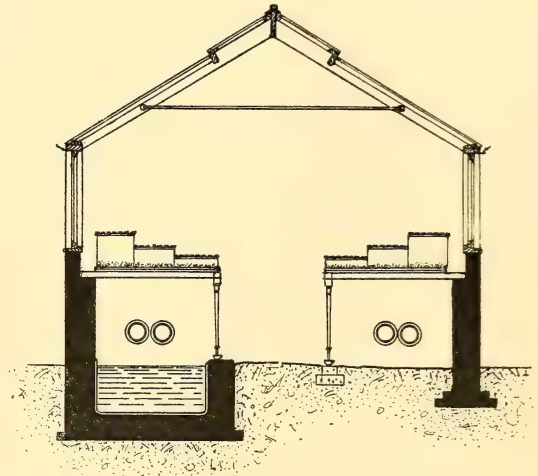


Fig. 683.—Cool Orchid House.

roofed section of the range in three divisions previously alluded to, with a width of 10 or 12 feet, and 8 or 9 feet in height, the path down the middle of the house, and the staging on either hand. Or it may be built as a lean-to or three-quarter span facing north, north-east, or north-west, cool Orchids succeeding best when they escape the full effect of the solar rays in summer. If convenient, the walk may be sunk a couple of feet below the surface of the ground, to assist in keeping the house cool in summer.

For glazing Orchid houses the best 21-oz. English glass, in pieces 9 inches wide and 12 to 18 inches long, is best; but of course the glass must be cut to fit the wood-work of the house; if the panes are of moderate size, the cost of replacing them, if broken by frost or otherwise, is not great. For new houses it is best to have the roof as light as possible, consistent with stability.

Stages and Floors.—If the span-roofed range recommended is to be built to the widest

measurement given, a stage should extend along both sides with a table-like stage in the middle. If a house is built for *Odontoglossums*, &c., on the lesser scale, a stage on either hand with the walk through the middle are most convenient. Orchids like to be raised above a stage covered with shingle, small coal, ballast, or any other moisture-holding material, the plants being the more easily supplied with moisture and a free circulation of air. Inverted flower-pots, which are often used, are unsightly, and they harbour insects and slugs; the raised open stage, higher at the back than at the front, is therefore preferable. A proper and convenient stage for Orchids may be described as follows:—The upright supports and the frame on which the stage proper is placed should be of light iron, ordinary angle-iron being by far the best. The front and back supports should also be of angle-iron placed so as to form a rim to hold the shingle or other substance to be placed thereon. The back support should be at least an inch from the side of the house in order to allow warmth and air to circulate. Light iron bars running from front to back should be placed to support the slates or tiles to form the stage. Ordinary flat red roofing-tiles a foot square do excellently well. Over these a layer of shingle, ballast, or coke-breeze is placed. This forms the lower staging, which is to be kept constantly wet. Above this an open or lattice wooden stage should be fixed; if constructed in three steps, the back one the highest, it will be an advantage in watering, &c. An excellent and convenient open staging, to be removed or placed as required, can be made of battens by any handy man, and if made in lengths of about 12 feet it will be found especially useful. The front lattice stage should stand on single brick above the permanent stage, the second on two bricks, and the third on three. The bricks and the whole of this upper staging can be conveniently removed during cleaning or other operations, and returned to its place as required. This is the cheapest, cleanest, and most convenient kind of open staging, and it can be whitewashed twice a year with little trouble and the harmful effect of painted staging avoided. The double staging has this advantage also: the lower close stage prevents the hot dry heat from the pipes from ascending directly to the plants, and also provides a sure and regular supply of moisture above.

Some cultivators construct their Orchid houses as follows:—The ground space except the path is converted into tanks, which serve

as reservoirs for rain-water, and also afford the requisite atmospheric moisture through evaporation. The open or lattice stages are fixed over the tanks, which, of course, are all open, so that the water that runs from the plants drops back into the tank. For cool Orchids this is an excellent arrangement. It is, however, costly, the tanks, if properly made, being an expensive item. If an old plant-house is to be turned into an Orchid house, clear out the inside, take up the flooring if of cement or other hard substance, so that there be only an earth basement; provide wooden trellises for the walks; see that the arrangements for ventilation, heating, shading, and other matters are suitable, and fit with an open wood-work ordinary plant stage, graded to bring the plants well up to the glass, and a cheap and good Orchid house is provided. But the ascent of the heat from the pipes, especially in cold weather, must be prevented by placing a row of slates over the staging where the heat is likely to injure the plants, and unlimited moisture must be forthcoming from the basement, especially in warm weather. For the flooring nothing is better or healthier in an Orchid house than the natural earth, which, for cleanliness and neatness, may be covered with shingle or cinders. An oak or pitch-pine trellis may be placed along the middle of the path in houses where a wet walk would be objectionable. Paths of Portland cement, tiles, or flag-stones are sometimes used, but they are not so favourable to good cultivation.

Water Supply.—Rain-water only should be used for Orchids. Sufficient tankage should therefore be provided in the basement of each house to catch all the rain-water possible. In former times it was considered necessary to warm the water by running hot-water pipes through the tanks. Such an arrangement, however, is often fraught with danger, especially in winter, from the excessive moisture raised. Water which has been stored in an unheated tank for some hours in the house in which it is to be used is warm enough for even the most tropical species. When in summer the supply of rain-water is in danger of running out, water from a pond or rivulet which is not "hard" should be brought into the house and mixed with that in the tanks for use until rain comes. Some allege that the rain-water of towns cannot be good, by reason of the sooty deposits on the glass and other surfaces on which it fell; but this very soon settles in the tanks, and the water is if anything the better for it. The tanks should be cleaned out annually.

DENDROBIUM PHALÆNOPSIS

There are about 300 species of *Dendrobium*, all natives either of the tropics of Asia, Australasia, or Polynesia. Many of them have large handsome flowers, and are therefore favourite garden Orchids. With few exceptions, they require tropical treatment, and where the requisite temperature can be afforded many of them are easy to grow. One of the best is *D. Phalænopsis*, a native of New Guinea, which was introduced in quantity about ten years ago, and has since proved exceptional, even among *Dendrobiums*, in the size and beauty of its flowers, their range of variation in colour—from white to deep red-purple—and their lasting qualities, and in its freedom of growth and flower under suitable conditions. It appears to be abundant in a wild state, many thousands of plants being sent home by collectors yearly. It is found growing wild on honey-combed limestone rocks, always exposed to bright sunlight, and so near to the sea that the salt spray reaches the leaves in rough weather. Under cultivation it requires a hothouse with plenty of moisture and sunlight during growth, followed by a rest in a cooler house. It flowers in autumn. In some of the varieties the flowers are three inches across.



DENDROBIUM PHALAEOPSIS

Shading.—The necessity of sunlight for Orchids generally will be understood if we bear in mind that many of them when wild are in close proximity to the equator, where on clear days the sun shines perpendicularly over them, or at a very slight angle, while under cultivation the sunlight comes to them at a much greater angle, so that we are not able to give them much more than one-half as much light here, taking the year round, as they would get at home. But the difference between the conditions in the open air and under glass is considerable. In every case a bright, clear light, toned to prevent sun-burn, is essential to the healthy growth and flowering of most of these plants.

Plants which grow at a high altitude "in the full blaze of the sun" require to be carefully shielded from bright sunshine under cultivation

house, and the East Indian house, require thicker blinds than the Cattleya or intermediate house, whilst the Mexican *Lælias*, *Barkerias*, *Dendrobiums*, &c., only require the very lightest and gauze-like shade. Walters' wood-lath blinds (fig. 684) are the very best form of shading for orchids, as they admit direct sunlight in such a way as to benefit the plants without scorching them. The blinds should run on supports 4 to 6 inches above the glass, to admit of a current passing under them. The blinds should be down only when required to protect the plants from the sun's rays, and drawn up during spells of dull weather. The sole object of shading is to protect the plants from excessive sunshine, but to exclude as little light as possible.

Fresh Imported Orchids.—In forming a collection of Orchids, newly-imported plants, or those which have been what is called "semi-established", are as a rule the best. Preference should be given to the fresh arrivals, which almost invariably start into growth more vigorously than plants which have already undergone a course of artificial treatment, and which often suffer through being passed from one system of management to another. Spring is the best time to get imported Orchids, but any other season need not be objected to, provided the plants have escaped frost and are in the proper condition on arrival. Generally the plants on arrival

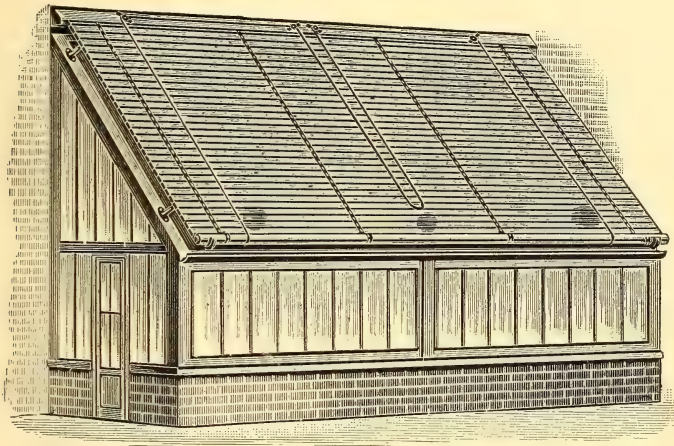


Fig. 684.—Walters' Shading for Orchid Houses.

here. A plant growing wild in its native home and in the free air is very differently situated from one cultivated under glass, and, unfortunately, in many cases under glass of very bad quality. It should therefore be understood that every house set apart for Orchid culture will require to be shaded for a portion of the year. Some cultivators use a stipple laid on the glass with a brush, or even syringed on, but it is not a good plan, as it is there in dull weather, when all the light possible is an advantage. It is also apt to be washed off in rainy weather, and when bright sunlight follows, the plants are in danger of being scorched worse than if no shading had been used. Such shading can be used for the ends and parts of the roof of the house where the canvas shading does not meet. The roof-shading should be of canvas blinds on rollers. The *Odontoglossum* or cool

are at rest, and more or less emaciated by their long journey. They therefore require a course of treatment that will make them plump again. It is, however, useless to supply them with soil until they start into active growth by pushing out new roots. Orchids with pseudo-bulbs, such as *Odontoglossums*, should be carefully looked over on their arrival, removing all dead portions, or any insect pests which may come over with them. Each plant should then be placed in a small pot filled with clean crocks so placed as to hold the plant steady, using a stick also if necessary, and placed in a cool or temperate house of that degree of humidity which will ensure the plant's being supplied with sweet, moist air. After three days the crocks which support the plants in the pots may be watered daily, as the moisture passes quickly away. In time the plants will

commence to grow and root, and then, and not till then, should they be finally potted. The length of time after arrival in this country before the plants start into growth differs according to the state in which they were collected abroad, &c. Species that require a long rest, and which were collected at the beginning of their resting season, are slow to start, whilst others may begin to grow vigorously in a few days. The condition of the growing-point or bud of the plant must also be considered; if injured or broken off during manipulation by the collector it will be slower to get away again than if it had escaped injury.

Plants with no distinct pseudo-bulb, or with more or less woody stems and fleshy distichous leaves, such as *Phalænopsis*, *Vanda*, *Aerides*, *Saccolabium*, and *Cypripedium*, are more liable to injury through importation. As soon, therefore, as they are unpacked they should be saturated by immersing them in a rain-water tank for half an hour, afterwards suspending them singly, head downward, in a shaded house, taking them down and giving them a dip every morning until they are plump, when they should be crocked up in pots or baskets as recommended for pseudo-bulbous kinds. No matter how high a temperature an Orchid may require when established, it should, if freshly imported, be placed in a moderate temperature until it is seen to be about to grow and root freely, when it should be potted and placed with the established plants.

TABLE OF TEMPERATURES.

MONTHS.	Warm House (East Indian).		Intermediate House. Cattleyas, &c.		Cool House. Odontoglossums &c	
	Day Degrees.	Night Degrees.	Day Degrees.	Night Degrees.	Day Degrees.	Night Degrees.
January	65-70	60	60-65	55	50-55	45
February	65-70	60	60-65	55	50-55	45
March	65-70	60	60-65	55	55-60	50
April	65-70	60	60-65	55	55-60	50
May	70-75	65	65-70	60	60-65	55
June	75-80	70	70-75	65	60-65	55
July	75-85	70	70-80	65	60-70	55
August	75-85	70	70-80	65	60-70	55
September	75-80	70	70-75	65	60-65	55
October	70-75	65	65-70	60	60-65	55
November	65-70	60	60-65	55	55-60	50
December	65-70	60	60-65	55	50-55	45

The day temperatures to be attained by sun-heat when possible.

Temperatures.—Orchids grown under comparatively cool treatment are as a rule the healthiest. A temperature much lower at night than in the day is of vital importance. A thermometer should be in every house, and the required temperatures indicated on a tablet attached. Care

should be taken that the temperature at night does not fall below that prescribed, especially in the case of the lower temperatures; the running up of the temperature in the daytime by sun-heat on hot days, even much beyond that here recommended, need not cause anxiety if the house is properly damped down, ventilated, and shaded. Extra heat, if caused by the sun, is more beneficial than otherwise. Fire-heat, on the contrary, is a necessary evil, and if the temperatures indicated could be maintained without its use, the plants would be all the healthier, excess of artificial heat being too often the cause of the bad health, or even the death, of large numbers of Orchids.

Humidity of atmosphere is secured by liberally and frequently sprinkling water on the floors and under the stages, and by syringing the walls. It used to be the custom to have evaporating troughs on the hot-water pipes, and to raise steam by syringing the hot pipes, but the practice has been wisely discontinued as it always injures the plants, and sufficient moisture can be maintained in a more natural, simple, and beneficial manner.

Potting materials.—There is nothing to equal good brown fibre from bracken-peat and living sphagnum moss for all epiphytal Orchids. Where these are to be had nothing else is needed. The fibre of *Polypodium vulgare* is also used, and is perhaps the next best thing to the bracken-peat fibre, but in this country it is not likely, for many reasons, to get into general use. Unfortunately a good light, thick sample of the right sort of Orchid peat is difficult to obtain; but rather than pot in bad peat, it is better, where possible, to defer repotting until the best quality can be got. It should be broken up by hand, and on no account beaten to pieces with spade or chopper. The stout bracken rhizomes should be set on one side to be placed over the crocks in the larger pots, as it is excellent material for the roots to run amongst, and lasts for years. The sphagnum should be picked over to remove bits of wood and other debris, and if not wanted for immediate use it will keep alive for a considerable time if simply covered with mats and allowed to take the weather under a north wall outside, or in a cold open shed; in no case should it be allowed to get dry, or it will die.

Potting Epiphytal Orchids.—There can be no set time for potting or basketing Orchids. There are, however, two main seasons in which the whole of the plants should be gone through, and those which require it shifted into new

pots or baskets, but in no case should a plant be repotted unless it is needed. September and February are favourable times for a general overhauling of the collection. *Cattleyas* and *Lælias*, such of them as require it, may be shifted at any time in the summer, good fibry peat and crocks only being used. The Brazilian species should be kept rather dry after repot-

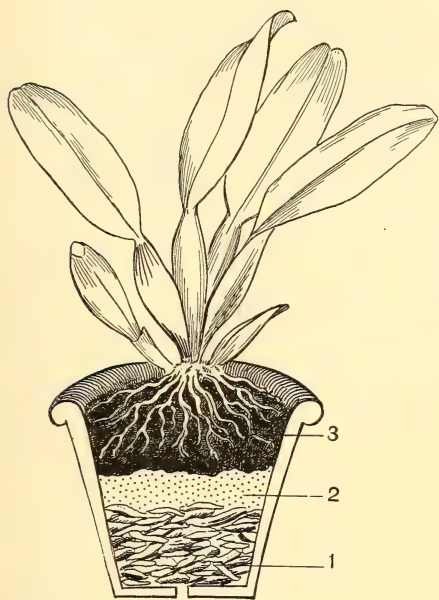


Fig. 685.—Section through potted *Cattleya*, showing: 1, crocks; 2, sphagnum or coarse fibre; 3, compost.

ting until they are seen to be starting new growths; thus treated they root better if kept in a moist atmosphere after potting. The end of September is a good time for overhauling *Odontoglossums*, *Masdevallias*, and other cool-house plants. Pots half-filled with crocks should be used, and for potting material equal parts of fibrous peat and sphagnum, without admixture of sand or anything else. The contents of the warm or East Indian house, *Aerides*, *Saccolabiums*, *Vandas*, &c., should be gone through at the end of February, or early in March; those that require to be repotted, if in pots, should have the pots filled two-thirds with clean crocks, the older roots to be placed among the crocks. The potting material should be living sphagnum only. All the species in the warm house, and any of the other epiphytal species in the intermediate house, may be grown in baskets, and in the case of the East Indian species it is doubtful whether this is not the best way to grow them, for their roots require almost as much air as their leaves, and it is not so easy to get air to them in pots as it is in baskets. Equally good specimens have, how-

ever, been grown in pots as in baskets, so that it becomes more a matter of choice than necessity. Small plants which enjoy a position near the roof-glass are best in baskets or pans. An Orchid should never be repotted unless it really requires it, and then, no matter what the season may be, the operation should be performed. Large pots should be avoided, pots relatively small for the size of the plants being suitable, overpotting being a source of much mischief. A good time to repot any Orchid is when it has flowered and is seen to be sending forth new growth, and to be making fresh roots. Those species which flower with the young growth should be repotted after the flowers are over.

Potting Terrestrial Orchids.—By “terrestrial” is meant those species which grow on the ground, and by “epiphytal” those which grow on trees. These terms, although somewhat arbitrary, have for gardeners a useful significance, for they indicate whether the plant obtains its food chiefly from the soil (terrestrial) or from the atmosphere (epiphytal), these latter requiring good holding open material in which to grow. Potting material for terrestrial Orchids is of various combinations. For *Calanthe*, *Phaius*, and most of the strong-growing kinds many use with success three-fourths good turfy yellow loam broken up by hand, and one-fourth Orchid peat and silver sand, the pots used being crocked one-third the way up. Where really good loam can be got this is excellent. A useful mixture for most terrestrial Orchids consists of one-third turfy yellow loam broken by hand, one-third brown peat, and one-third sphagnum moss and silver sand. Or a useful and economical mixture may be made of one-half turfy yellow loam, and the other half composed of the best of the old stuff taken from the epiphytal Orchids when they were repotted, with a little sand added. Some cultivators use dried cow-manure in the soil for such plants, but it is better to rely on the application of a little weak liquid manure at the proper time. For some of the stronger species a slight sprinkling of $\frac{1}{2}$ -inch or $\frac{1}{4}$ -inch bones, or a thin layer of the same placed over the crocks is good, especially for *Cypripediums*. Terrestrial Orchids should not be raised much above the rim of the pot, as for the epiphytal species.

The time for repotting terrestrial evergreen Orchids is soon after the flowering is over. These require to be kept moist all the year. Deciduous terrestrial Orchids which lose their leaves, and therefore require a dry period of

rest in a cooler temperature, viz. *Thunias*, *Calanthe vestita* and its varieties, *C. Veitchii*, *C. Regnieri*, and all that section, require a strong heat when growing. These all start in February or soon after, and when the new growths are seen to be an inch or so in length, they should be repotted, placing the largest bulbs singly in 5-inch pots, and the smaller ones several together. They should then be placed on a stage or shelf near the roof-glass, and kept tolerably dry until the roots are seen to be taking hold of the soil, when they may be watered liberally and regularly until the growths are fully made up. During active growth a little very weak liquid cow-manure may be given them. When the leaves begin to turn yellow, water should be given sparingly, and on the flower-scapes appearing only sufficient water should be given to keep them going. After flowering, the plants should be stored on a dry shelf in a temperature not less than 55° Fahr., and be kept entirely without water until repotting time. *Cypripediums* may with safety be repotted whenever they require it, after they have flowered being perhaps the most convenient time. *Disa grandiflora*, *D. racemosa*, *D. tripetaloides*, and the hybrids from these, should be repotted in October and kept in a cool house. They require water all the year round, but especially heavy waterings from February until their flowers are over.

Hardy and *cold-frame* Orchids are chiefly the North American *Cypripedium spectabile*, *C. acaule*, *C. pubescens*, *C. parviflorum*, &c., and the best of the European species of *Orchis*, *Ophrys*, &c. Some succeed with them, but many fail because they do not consider the nature of the plants. They grow mostly in moist woodland or boggy situations in decayed moss or other decomposed vegetable material, and although they experience cold in winter, they are protected by fallen leaves and snow. These facts should indicate the treatment most suitable for them under cultivation. They do best on the shady side of a rootery or rockery, in moist situations, in the material recommended for terrestrial Orchids, to which about one-third its bulk of well-decayed leaf-soil has been added. At the approach of winter about 4 inches of sphagnum moss, or of dry leaves, should be lightly placed over the crowns, and this should not be removed in spring, but allowed to settle; it should be renewed every autumn. In spring and summer they require plenty of water; but after flowering, as a rule, no water need be given, the rains supplying sufficient. Those

who prefer to grow them in an unheated pit or frame will find them do best in well-drained pots or pans, and kept copiously watered. On the approach of hard frosts in winter some dry leaves or other material should be placed over the crowns, and the frame closed, not to be opened until spring.

Satyriums may be grown successfully in an unheated frame in full sun. During winter they should be covered with 6 inches or so of dry leaves, to be removed in March, when the tubers should be repotted and watered. They flower in summer, and after flowering require no water. Many of the South African *Habenarias*, deciduous *Disas*, &c., which have been found so difficult to manage in green-houses, would probably do well if treated in this way.

Ventilation.—Whatever the temperature of the air, it should be pure, and to ensure this, free ventilation must be resorted to. The ventilators should be just above the ground-line for the lower ventilators by which air is admitted, and at the highest point in the roof for the egress of the vitiated air. At the same time care must be taken that the openings of the ventilators are carefully balanced so as not to cause currents of air likely to be injurious. For this reason it is better to open all the ventilators an inch or so than to open two or three of them wide and allow the rest to remain closed. Bottom air may be conveyed to each house by laying large drain-pipes from the outside of the block. The pipes should be open to receive air outside the house, and openings in them should be made inside the house to allow the ingress of fresh air.

The ventilators are important as a means of regulating the temperature of the house. Care, however, should be taken not to put on too much air, especially by opening the top ventilators. A draughty house, though cool, is far more injurious than a close house. Except during very severe weather, when the fires have to be worked hard, air should be left on the bottom ventilators all night and all the year round, plants thus treated soon showing by their appearance that it is good for them. It is a wise plan to cover the insides of the traps of the bottom ventilators with fine wire-netting, to keep out cats, rats, &c.

Moisture is a very essential factor in the health of Orchids, and the distribution of water on and under the stages and on the floors assists towards keeping the correct temperature and a humid atmosphere. In spring, summer, and early

autumn, too much cannot easily be given, but in winter a drier air is required. At all seasons the supply of moisture should be regulated by the weather outside. In bright sunny weather much more water should be distributed about the houses than in dull weather. In very hot weather it is a good plan to thoroughly damp down the house at mid-day, and at the same time throw open every door for five or ten minutes, which ensures a thorough change of air about the plants.

Syringing.—The use of the syringe in the Orchid house, so far as syringing the plants is concerned, has steadily declined, until now in some of the best collections it is discontinued altogether, as being mischievous unless limited to the walls and about the stages. It may be used for *Dendrobiums* when in full growth and in a very high temperature, but even for these it is not necessary, a more regular supply of moisture, more beneficial to the plants too, being kept up by liberal watering at the root, and by frequently damping down.

All Orchids when actively growing require a liberal supply of water at the root if the drainage is perfect, so that the water does not stay to sodden the material about the roots, even the most moisture-loving of Orchids being injured by this condition. Tropical Orchids require moist heat when they are growing, and even the cool-house species are not easily injured by it at that season. Hence it is that some growers, who prefer high temperatures, get their plants to thrive marvellously for a time; but when the resting season comes, unless the temperature is fitted to the season of repose, collapse results.

The season of growth for Orchids varies, and in a large collection there are always plants in full growth. Each plant gives unmistakable signs of awakening activity to the thoughtful grower, and again shows by its behaviour when it would benefit by a rest. Growth having fully matured, flowering taken place, and a more or less lengthy period of rest having been provided for, the next young leaves or growths which the plants make will be known to be new growth, and an infallible indication that the growing season has arrived, when moisture and increased heat should be given. Any advance which the plant may be induced to make before its time will result in a loss of vigour, growth always being most vigorous after a full rest.

Spring-time is, as a rule, the beginning of the growing season of tropical Orchids, and our winters being long and dull, it should be

the object of the grower to use all the means in his power to induce as many of the plants as possible to finish growth early in the autumn while there is yet sufficient sunlight to thoroughly ripen them.

Resting Orchids.—Orchids may roughly be divided into three large classes, viz. the deciduous epiphytal, the evergreen epiphytal, and the terrestrial. Of the deciduous epiphytal we have examples in *Dendrobium nobile*, *D. Wardianum*, *D. crassinode*, and all those species whose leaves turn yellow and fall soon after the pseudo-bulbs are matured. These should be rested in a perfectly dry house in a light position, and in a temperature of 50° to 60°, unless the excess is by sun-heat, and be kept dry until flower-buds appear, when a little water may be given. A vinery or other resting fruit-house is suitable for resting Orchids. Should a suitable house not be available, and the pseudo-bulbs shrivel through excessive drought, a little water ought to be given, say once a week or so, in order to keep the old bulbs tolerably plump. *Catasetums*, *Mormodes*, *Cynoches*, *Galeandras*, *Cœlogynes* of the *Pleione* section, and all Orchids which by the dying and falling of the leaves show that they require a protracted dry and cool rest, should be treated in this way.

A large number of *Dendrobiums*, such as *D. thyrsiflorum* and *D. Farmeri*, *Cattleyas*, *Lælias*, *Oncidiums*, &c., are of an evergreen, or partly evergreen, character, losing some leaves every year, but not those of the preceding year's growth. These may be rested in their own house by a more free admission of air and partial withholding of water. *Aerides*, *Saccolabiums*, *Phalænopsis*, and all the species with woody stems and distichous leaves, each require a rest after the last made leaf is as long as the others, and no more leaves are proceeding from the centre, an indication that growth is finished and rest required.

Evergreen terrestrial species, after having matured their growth and flowered, only require sufficient moisture to keep up the already formed tissues until growth again begins. The importance of recognizing the proportionate seasons of growth and rest for Orchids under cultivation is not far to seek. A year's work in a twelvemonth is the imperative necessity, not only for Orchids, but for every perennial in the vegetable kingdom. Under natural conditions the seasons and climate regulate these periods of growth, maturity, flowers, and rest, perfectly, although in many instances in a manner quite different from that resorted to

under cultivation. For example, many of the Indian Dendrobies, whilst at rest, are so dried up by the heat that they are scarcely recognizable as plants at all, and would undoubtedly perish but for the cooler nights. The hot dry season, when growth is impossible, holds the plant in check until the cooler, moist, growing season arrives, followed by a temperate period, when the flowers expand, and thus the year is made up. Were we to subject these plants to the heat and other conditions they get in their own country, death would soon result. We see, however, that a period of inactivity is a necessary factor in the life of the plant, and as this can be given just as well with a low temperature and drought, the end is the same. Success in every operation connected with Orchid culture depends on a proper observance of the seasons, so that while a full year's work is demanded, no more shall be attempted. Many spindly winter growths and poor premature flowers are the result of neglecting this question of rest.

Watering. — Orchids should be looked over every morning, and those which require it watered with rain-water where possible, and with a liberal hand. In the heat of summer, the first thing in the morning is the best time, and at that season it is also well to look over them again in the evening. In winter and in cold weather it is better to wait until eight or nine o'clock in the morning before watering. At that season, of course, comparatively little water will be needed. The condition of the growth of the plant should be the test as to the quantity of water given. Where growing and resting plants are kept in the same house, it is safer to place each class together. If a plant is really actively growing, it requires a thorough soaking, and then to be allowed to remain, even if it be a day or two, until it is, although still moist, beginning to get dry again, when the thorough watering should be repeated. If at rest, the plant either wants no water, or but little at intervals of two or three days.

Orchids in baskets or pans suspended near the roof-glass generally grow satisfactorily. Baskets made of wire and various woods have been used, but none have proved so good as those of teak-wood, which can now be purchased at a far less cost than it would take to make them. They are supplied with copper-wire suspenders, which are by far the best, as of all kinds of wire copper is the least harmful. Galvanized iron-wire should not be used.

Cleanliness, both in the plants themselves, the stages, and woodwork of the house gener-

ally must be insisted on if success is to be assured.

The arrangement of the plants in the house is a matter of some importance. It should be borne in mind that the smaller and more delicate in construction the Orchids are, the nearer the roof-glass should they be. Whilst it may not be possible to suspend all such plants, some of them may be elevated on a special stage raised above the rest. Generally the plants should be one



Fig. 686.—*Epiphronitis Veitchii*.

foot from the roof-glass; if nearer, there is a risk of damage during severe frost. A plant may do better in one position than another in the same house; this may be due to the direction of air-currents, shade, moisture, &c.; at any rate, it often pays to move plants to another position if they do not look happy.

Propagating Orchids.—In most cases Orchids are propagated by division. All those with pseudo-bulbs springing from rhizomes or woody connecting stems, like *Cattleya* and *Lælia*, grow onward, the back bulbs having dormant eyes at the base. At the distance of two or three bulbs from the leading growth these rhizomes may at any time be cut half through, in order to induce what is termed a back break, and when such

growth has been obtained, the pieces may be removed to form new plants. A few Orchids are propagated most readily by cuttings of the ripened pseudo-bulbs, 3 or 4 inches in length, placed in pots in a warm growing house, and treated like cuttings of other plants. Thunias, many Dendrobiums, Epidendrums, and others may be multiplied by this means.

Hybrids.—Artificially-raised hybrid Orchids

now receive much attention from growers, both amateur and professional, and many new and beautiful hybrids have been obtained. Some startling crosses have been accomplished, and it would appear that Orchids differ in this respect from other plants, which do not hybridize unless the species are closely allied. Bi-generic hybrids—namely, *Sophro-cattleya*, between *Sophranitis* and *Cattleya*; *Epiphronitis*,

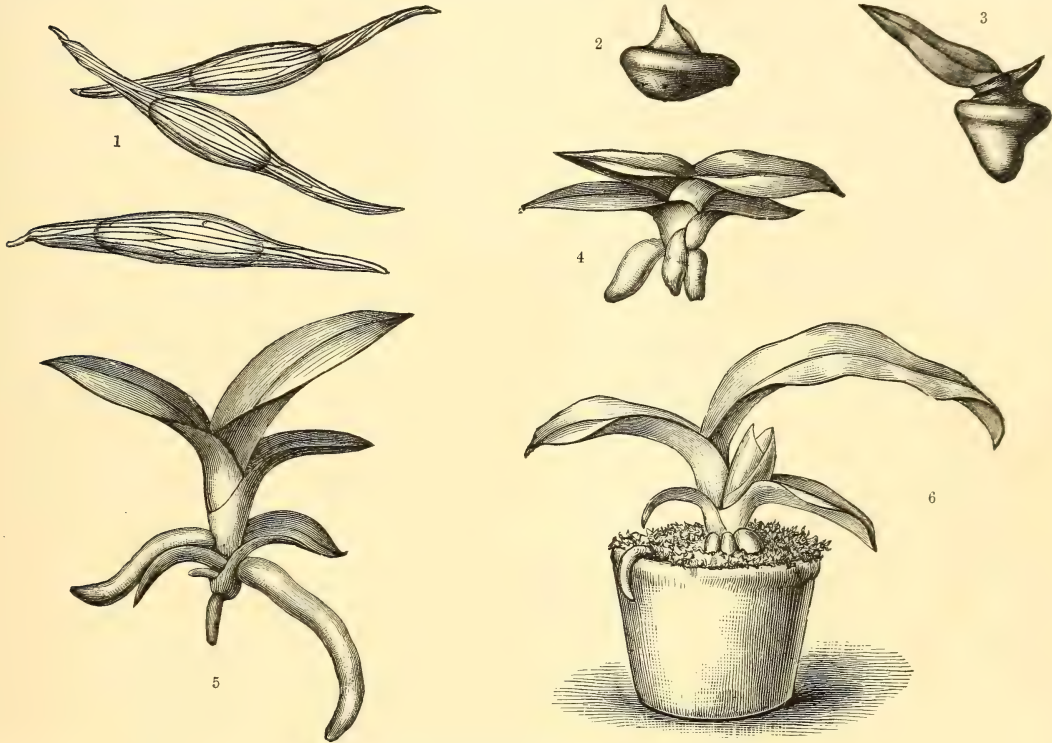


Fig. 687.—Development of *Cattleya*, from the Seed to two-year-old Plant.

1, Seeds. 2, Seedling (6 months). 3, Seedling (9 months). 4, Seedling (12 months). 5, Seedling (16 months). 6, Seedling (2 years). 1 and 2, Greatly enlarged. 3-6, Natural size. (From Veitch's *Manual of Orchidaceous Plants*, by permission.)

between *Epidendrum* and *Sophranitis* (fig. 686); *Phaio-calanthe*, between *Phaius* and *Calanthe*; and *Epicattleya*, between *Epidendrum* and *Cattleya*—have been produced, and still more startling hybrids are said to be maturing. *Cypripediums* have hitherto received most attention, as they ripen their seeds well, which germinate freely, and the plants flower quickly.

Although it is easy to get the seed-vessels to ripen, they do not always contain good seeds, and even when the seeds are good, it is often a difficult matter to get plants from them. It is the practice to sow the seeds on the surface of the pots containing the parent plants, carefully recording the cross and date. After the seeds have been sown, water must be supplied with care, dipping instead of watering the pots, and allowing the water to soak upwards so that

the seeds are not disturbed. The seeds do not thrive when sown in soil specially prepared for them. The seedlings should appear in due course, and as soon as they are fit to handle they should be pricked off into thimble-pots containing finely-chopped peat and sphagnum, three or four round the rim of each, and afterwards plunged, ten or a dozen together, in sphagnum moss in seed-pans of convenient size. These operations require much care and patience, which may be rewarded with results of the greatest value or the reverse (fig. 687).

Pruning Orchids.—Some Orchid-growers advocate the cutting away every year of all the old pseudo-bulbs of some *Dendrobiums*, the plants being then placed in a hot swampy house to make their growth. Pruning of a less drastic character, and which ought to be resorted

to more than it is, consists in cutting away all small, old, worn-out pseudo-bulbs, which so often disfigure Dendrobiums, Cattleyas, Lælias, Epidendrums, &c., and which are not only useless and unsightly, but they interfere with the new growths, if not by depriving them of nourishment, at any rate by the obstruction of light and air.

All yellow or badly-spotted foliage should be removed from growing plants, on the principle that decay is often the result of disease, which may be propagated if the leaves are left on the plants. Masdevallias and such-like plants often bear twice as many leaves as they ought to, and the least sign of unsightliness on one ought to be the signal for its removal, the leaf being cut a quarter of an inch above the joint to which it would naturally die back.

Basket Orchids.—Some Orchids require to be grown in baskets, because their flower-spikes grow downwards, which in pots would be spoilt. Stanhopea, Coryanthes, Acineta, Luddemannia, Gongora, and Cirrhæa are genera with this habit. There are also many Orchids which display their flowers to greatest advantage when grown in baskets suspended from the roof. Among these are *Ceologyne Massangeana*, *C. tomentosa*, *C. Dayana*, and others; *Dendrobium Falconeri*, *D. Wardianum*, *D. crassinode*, and many others; *Saccolabiums* of the *Rhyncostylis* section, and indeed most of the Orchids which have long graceful racemose flower-spikes. The objection to baskets is, that after thriving for a time, and rooting all over the wood, it either decays, or the plant needs a larger one, and a serious check is the consequence of its removal.

Top-dressing is necessary for Orchids grown in baskets, when all movable worn-out stuff should be taken away and replaced with new. Where it can be used, the syringe is helpful, as with its aid all loose material is washed out, and the roots and basket more or less cleaned without any danger of bruising.

Manure for Orchids.—On the whole it will be better for the Orchid-grower to steadily set his face against the use of manures in any form for epiphytal Orchids, and to carry it out on a very small scale, and in a very cautious manner, for the terrestrial species. Chemical manures should not be used. Weak liquid cow-manure may be given to *Calanthes*, *Phaius*, *Peristerias*, *Zygopetalums*, *Lycastes*, and other very strong-growing terrestrials, although some of the best plants ever seen in the country have been grown without its aid. A sprink-

ling of good guano under the stages in the evening occasionally, and especially in spring, or pouring weak liquid manure late in the day on the stages and under them, assists materially in giving healthy foliage and in keeping down insect pests.

Insects.—Orchids are liable to be attacked by aphides, especially in the spring, and by thrips, of which the minute yellow species is the worst, at all seasons. These are got rid of and kept down by dipping or washing or spraying with some insecticide, or by fumigation. Scale and bug of different kinds require careful removal by means of brush—a soft tooth-brush is best—and sponge. Cockroaches should be kept down by placing beetle-poison about the houses, and by hunting for them at night. Wood-lice must also be trapped. The Orchid-fly (*Isosoma Orchidearum*), which deposits its eggs in the young growths of Cattleyas, Lælias, &c., is also most destructive if it once gets established. In the course of time the grubs are hatched out, the young growths of the plants present a swollen appearance, and are injured beyond repair. Sometimes the roots are attacked in the same way by this or other of the insects, including borer-beetles, which have been imported with Orchids of late years. The only way to deal with them is to ruthlessly cut off and burn every affected young growth or root, even if it be at a heavy cost. The insect in its perfect form should be looked for morning and evening; it resembles a small, black, winged ant. By perseverance the pest is to be got rid of before much damage is done; the plants which have had their swollen growths cut off usually break well from other eyes.

Fumigation, when necessary, should be done lightly on three successive evenings, either with pure tobacco leaf or "XL All", which is safe, and usually destructive to thrips. Generally it is better to fumigate lightly once a week or so, to keep the insects from gaining a hold. The dipping-tub should be always on hand at potting time, so that all the operations necessary for each plant can be done at the same time. Most gardeners have a favourite dip for killing thrips; weak tobacco water and an infusion of Quassia chips are often effective, and are harmless to the plants even if the liquid runs down to the roots. Paraffin as an insecticide is too strong for Orchids.

Cut Flowers.—Orchid blooms are showy, and in some cases, when cut, they last an extraordinary time, often running into months if carefully tended; the plants are greatly bene-



LAELIA ANCEPS VAR. SANDERIANA
(Grown in collection of Right Hon. Joseph Chamberlain, M.P.)



CATTLEYA MOSSIAE
(Grown in collection of Duchess of Marlborough)

fitted too by the removal of the spikes as soon as the flowers are fully matured. In some collections flower-holders containing water are kept in the Orchid house to receive the spikes of flowers which it is deemed advisable to remove, and which are not required for use in the dwelling-house or for sending away. In this way the plants are relieved, although the house is not denuded of the flowers. Shallow boxes should be used for sending the flowers a distance, layers of crumpled tissue-paper placed between the spikes holding them firmly without crushing them; cotton-wool should not be used, the crumpled tissue-paper being quite sufficient.

Foliage Plants with Orchids.—The Orchid house is dull at certain times of the year unless a few other plants are employed for its embellishment. These may be grown on the edges of the close stages, and on simple rockeries, not interfering with the heating, beneath the staging. *Adiantum cuneatum*, *A. Capillus-Veneris*, and most of the other Maiden-Hairs, *Panicum variegatum*, *Selaginella denticulata* and other species, *Begonia Rex*, *Sonerilas*, *Cyrtodeiras*, *Ficus repens* and *minima*, *Isolepis gracilis*, *Caladiums*, and such-like plants, are suitable for this purpose. Climbing plants of all kinds should be excluded from the Orchid house.

Spot or Disease in Orchids is the result of defective cultivation, generally too high a temperature. It affects chiefly the evergreen, fleshy-leaved species, such as *Phalænopsis*, *Aerides*, *Vandas*, some *Oncidium*s, and even *Cattleyas* and *Cœlogynes*. Apparently healthy plants suddenly develop dark-brown spots on the leaves, which in the course of time present dark dried-up patches of tissue. Plants thus affected are difficult to restore to health, but some good may be done by inducing them to make good rapid growth in the proper season, to be followed by a long rest in a cooler temperature afterwards. In some cases the disease is so virulent as to kill the plant outright.

A single Orchid house may be worked to perfection where there are other glass structures devoted to fruit or plant culture. The Orchid house itself should be heated and arranged as an intermediate house, the other houses being utilized for plants requiring special treatment. When the *Dendrobium*s, for instance, are seen to be about to grow, they should be placed in a Melon or Cucumber house. *Calanthes* will make very fine bulbs in the same quarters; indeed, any of the Orchids requiring a rapid growth in a hothouse should be so treated.

When growth is completed, the plants should be removed to the Orchid house. In the same way, when the deciduous *Dendrobium*s, *Thunias*, and other Orchids are losing their leaves and about to go to rest, they should be placed in a cool dry vinery, or greenhouse, where the temperature does not fall below 50°, where they will be properly rested, and the Orchid house relieved of their presence at their shabbiest season. On the appearance of the flower-spikes they should be returned to the Orchid house.

Collecting Orchids.—In the matter of importing Orchids, amateurs had better rely on the importations made under the auspices of the several trade firms who make a business of it. But in these days of travelling both for business and pleasure, an enthusiast may find himself in a country where Orchids are growing wild, or he may have friends abroad who would willingly send him interesting specimens if they only knew how to set about it.

Newly collected Orchids need no preparation, and very little packing. The time to collect them is when the last growth is fully matured and the new growth not started, in other words, when they are at rest. This condition is when the pseudo-bulbs are all of full size, and no young growth is proceeding from the base. *Aerides*, *Saccolabium*, *Phalænopsis*, and those which have no bulbs, when at rest have all the leaves full-grown and no young leaf proceeding from the centre of the plant; the root-tips are also hard. If the packing-cases could be on the spot, and the plants laid in them at once and despatched, they would have the best chance of travelling well. The cases should be about 3 feet by 2 feet by 2 feet, into which a layer about an inch thick of dry moss or wood shavings may be put, then a layer of plants with their heads all one way, then another layer of moss or even of paper, followed by another layer of plants with their heads the reverse way, and so on until the case is full; the plants should be pressed in rather closely during packing. Moss or packing material of any other kind may be dispensed with if not to hand. A few light struts or sticks placed between the plants about the middle, and secured by nails through the sides of the box, help to keep the contents from rolling about or shaking too close together. *A few small auger holes should be in each box.* Large openings should be avoided, or rats may get into the box whilst on board ship. The boxes should be forwarded by the most rapid steamer, even if higher freight has to be paid;

they should be labelled "Living plants, for cool dry place in hold".

The following is a select list of the showiest species, varieties, and hybrids. The letters W., I., C., mean Warm, Intermediate, and Cool house respectively. The temperatures for each house for each month throughout the year will be found at p. 562. The hybrids require the same treatment as their parents.

Acineta.—Epiphytes, chiefly from Central America, requiring to be grown in baskets for the display of their heavy pendulous racemes of fleshy, yellow, yellow-and-red, or chocolate flowers. *A. Barkerii*, *A. densa*, and *A. Humboldtii* are the best-known species. I.

Ada.—A small genus allied to *Brassia*, inhabiting the Andes of Colombia at an altitude of 8500 feet.

A. aurantiaca. Flowers in arching racemes, orange-scarlet. C.
A. Lehmannii. Flowers orange-scarlet, lip white. C.

Aerides.—Epiphytal, leaves distichous on stems; they may be grown either in pots or baskets, in crocks and sphagnum moss. The flowers, which are produced chiefly in summer and autumn, are wax-like in texture, and in colour white, blotched more or less with dark-rose or crimson.

A. crassifolium. Leaves fleshy. Flowers among the largest of the genus. Burma. I.

A. crispum. Flowers large, very fragrant. Nilgiri Hills and other Indian highlands. I.

A. cylindricum. Leaves terete, flowers white, with yellow and crimson lip; very fragrant. Indian hills. I.

A. falcatum. This includes *A. Larpentæ*, *A. expansum*, and *A. Leonie*. Flowers white and rose. Burma. I.

A. Fieldingii (Foxbrush). Flowers in long, dense, sometimes branched racemes. High lands in Sikkim and Assam. I.

A. Houlletianum. Yellowish-white and lilac. Cochin-China. I.

A. Lawrencei. The noblest of the *A. odoratum* section. Flowers large, white and crimson, very fragrant. Philippines. W.

A. maculosum. Dwarf, with showy racemes of white and amethyst flowers. Western Ghats, India. I.

A. multiflorum (fig. 688). Variable, similar in habit to *A. maculosum*, and of which the plants known as *A. affine*, *A. roseum*, *A. Lobbii*, and *A. Veitchii* may be regarded as varieties. Sylhet, &c. I.

A. odoratum. One of the oldest and best. Cochin-China and India. I.

A. quinque-vulnera. A noble species, requiring more heat than *A. odoratum*. Philippines. W.

A. radicosum. A compact plant from the Nilgiri Hills. Flowers ruby-red. Better known as *A. rubrum*. I.

A. Sanderianum. A yellow-and-crimson *A. Lawrencei*, and a very fine species. Philippines. W.

A. suavissimum. Very pretty, varying so much in size and colour of flowers as to have led to its being repeatedly renamed. Varieties of it are known as *A. Reichenbachianum*, *A. Rohanianum*, *A. Ballantineanum*, *A. nobile*, and *A. flavidum*. Malacca. W.

A. Vandarum. Leaves terete, flowers large, membranous, fragrant. Sikkim and Khasia Hills; altitude, 4000-5000 feet. I.

A. virens. Resembles a slender *A. odoratum*. Java. W.

Anætochilus.—Dwarf terrestrial Orchids grown chiefly for their very beautiful foliage. They are difficult to grow and not easily procured. They require a moist warm shady house, or may be grown under bell-glasses. India and Malay Archipelago. W.

Angræcum.—A curious genus inhabiting tropical and South Africa, Madagascar, and the Mascarene Islands, and bearing generally white fragrant flowers, with spurs often of extraordinary length.

A. articulatum. Dwarf, producing long pendent racemes of cream-white flowers. Allied to *A. Ellisii*. Madagascar. W.

A. caudatum. An extraordinary species from West Africa with large greenish flowers, with white lip and green spur 9 inches in length. W.

A. citratum. Dwarf, bearing racemes of pretty French-white flowers. Madagascar. W.

A. eburneum. A large grower, with stout spikes of large white flowers. Madagascar. W.

A. Ellisii. Flower-spikes pendent, 18 to 20 inches in length, flowers pure-white. Madagascar. W.

A. Leonis. A noble species with fleshy, falcate, vertical leaf-blades; the plant appearing as though compressed. Flowers large, white, fragrant. Comoro Islands. W.

A. modestum. Resembles a small form of *A. Ellisii*. Madagascar. A very free-flowering form of this is known as *A. Sanderianum*. W.

A. Scottianum. Leaves terete, like *Vanda teres*. Flowers large, pure-white. Comoro Islands. W.

A. sesquipedale. The finest *Angræcum*. Flowers white, 5 to 6 inches diameter; spur 1 foot in length. Madagascar. W.

Anguloa.—A very handsome genus of the same habit as *Lycaste*, and bearing large flowers which in some



Fig. 688.—*Aerides multiflorum* Lobbii.
(From Veitch's *Manual of Orchidaceous Plants*, by permission.)

degree resemble Tulips viewed externally. They are wax-like in substance and very fragrant. Chiefly summer-flowering.

A. Clowesii. Flowers bright-yellow. Colombia. I.

A. Clowesii, var. *eburnea*. Flowers white. I.

A. Ruckeri. Flowers green and brown externally; yellow densely spotted with red inside. Colombia. I.

A. Ruckeri var. *sanguinea*. Flowers yellow and dark-red. I.

A. uniflora (*virginalis*). Flowers white. Colombia. I.

Ansellia.—Stately Orchids inhabiting tropical and sub-tropical Africa, and bearing terminal racemes of rich yellow and red flowers on tall, leafy stems. Most of them may be regarded as varieties of *A. africana*. I.

Arpophyllum.—A small genus from Mexico and Central America, with short reed-like pseudo-bulbs, and arching, fleshy, green leaves. The spikes proceed from the apex of the bulb, and the densely-set rose-and-purple flowers are very attractive. *A. giganteum* and *A. spicatum* are the species usually seen in gardens. I.

Arundina.—Terrestrial plants of considerable beauty. Bamboo-like in growth, and bearing large rose-and-crimson flowers, in clusters from the top of the stems.

A. bambusaefolia. Evergreen, 3 feet high. Flowers large, magenta-rose, with dark-rose lip. India. I.
A. densa. Flowers rosy-lilac, with crimson-bordered lip. Singapore. I.

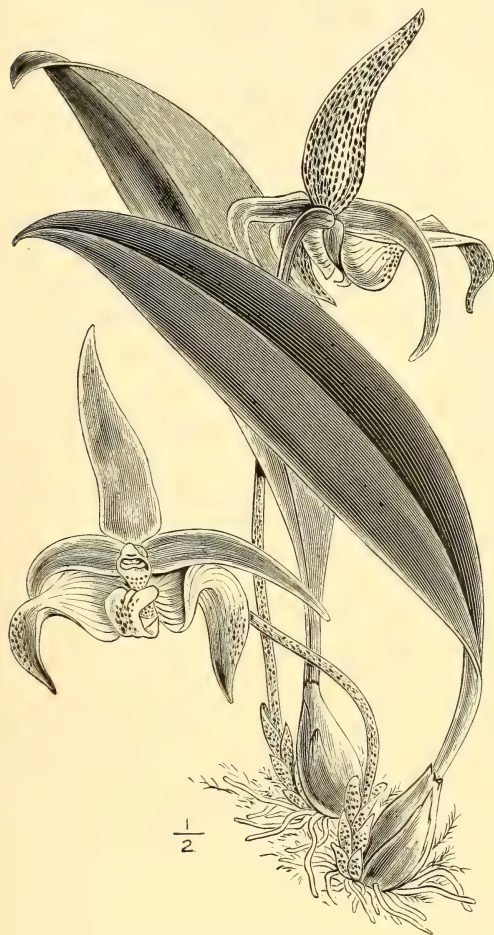


Fig. 689.—*Bulbophyllum Lobbii*.

Barkeria.—A section of *Epidendrum*, requiring to be grown on blocks or in baskets suspended in full sunlight in an airy house, and liberally watered when growing.

B. elegans. Spike five- to seven-flowered. Flowers $1\frac{1}{2}$ inch across, lilac and white, lip with dark-crimson blotch at tip. Mexico. I.

B. Lindleyana. Flowers numerous, rich rose-purple. Autumn. Central America. *B. centerea* and *B. cyclotella* are varieties of it. I.

B. Skinneri. Stems 1 foot, bearing erect racemes of deep-rose flowers. Winter. Mexico and Guatemala; altitude 3000 feet. I.

B. spectabilis. Flowers the largest in the genus, rose and white. Mexico and Guatemala. I.

Batemannia.—A small genus of which *B. Colleyi* and *B. Peruviana* are in cultivation. The name is also applied to a section of *Zygopetalum* (which see). I.

Bletia.—Terrestrial plants. The flowers are produced on erect spikes. *B. hyacinthina*, one of the best-known, thrives in a tolerably cool house; the purple *B. Shepherdii*, one of the handsomest, is intermediate.

Bollea.—A section of the genus *Zygopetalum*, with large and handsome flowers. The plants are leafy like *Huntleya*, and require shade and moisture.

B. caelestis. Flowers rich-blue. Colombia; altitude 6000 feet. I.

B. Lalindei. Rose and white. Colombia. I.

B. Lawrenceana. White, tipped with rose. Colombia. I.

B. Schroderiana. White, with pink lip. Colombia. I.

Brassavola.—A genus of dwarf evergreen epiphytes, with white or greenish fragrant flowers. South America. The only large-flowered kinds—*Digbyana* and *glauca*—are now placed under *Laelia*. I.

Brassia.—Epiphytal Orchids, chiefly of botanical interest, inhabiting South America and the West Indies. The best-known is *B. verrucosa*, though *B. caudata*, *B. Lawrenceana*, and others are showier. I.

Broughtonia.—Pretty epiphytes from Jamaica and Cuba. They require to be grown on bare rafts without moss or peat, and in the full sun. Water freely in summer.

B. lilacina (*Laeliopsis Domingensis*). Lilac. San Domingo. I.
B. sanguinea. Carmine-crimson. Jamaica. I.

Bulbophyllum.—Interesting epiphytal Orchids widely distributed in India, Java, Borneo, Africa, and South America, the flowers varying from the tiny *B. micranthum* to the gigantic *B. grandiflorum*. One of the prettiest is *B. Lobbii* (fig. 689). Some few require the hothouse, but most thrive in the *Cattleya* house.

Calanthe.—This genus may be divided into two distinct sections, viz. the evergreen or *C. veratrifolia* class, and the deciduous or *C. vestita* class. The latter require a long dry resting season, during which water should be withheld; the former should be kept moist all the year. The *C. vestita* class are the chief of those grown largely in gardens, and of which a great number of garden hybrids have been raised. These, from a florist's point of view, are among our best garden Orchids.

C. curculigoides. Yellow. Java. W.

C. Masuca. Purple. India. I.

C. Natalensis. Purple. South Africa. I.



Fig. 690.—*Cattleya citrina*.

C. pleiochroma. Rose. Japan. I.

C. rosea (*Linatodes*). Rose-pink. Moulmein. I.

C. veratrifolia. White. India, Australia. I.

C. × Veitchii. Carmine-rose. The first hybrid *Calanthe*. It was obtained by crossing *C. vestita* and *C. rosea*. I.

C. vestita. White, with yellow eye. India. I.

„ var. *Regnierii*. White, shaded purple. Cochín-China. I.

„ var. *rubra-oculata*. White, with red eye. India. I.

„ var. *Turneri*. White, with purple eye. India. I.

Catasetum.—Very extraordinary Orchids chiefly from South America, and exhibiting a wide range of form and colour, and many interesting structural peculiarities. All are worthy of a place in gardens, *C. Bungeorthii* and a few others ranking among our showiest Orchids. I.

Cattleya.—This genus shares with *Lælia*, *Dendrobium*, and *Odontoglossum*, the chief favour of lovers of showy Orchids. There are a great number of species, and also many garden hybrids. The following is a good selection:—

C. Aclandiae. Stems cylindric. Flowers 4 inches diameter. Sepals and petals yellowish, blotched chocolate; lip rose-purple. Brazil. I.

C. Bowringiana. Allied to *C. Skinnerii*. Flowers rose-purple. British Honduras. I.

C. citrina (fig. 690). Pseudo-bulbs ovate, leaves glaucous. Flowers large, pendulous, yellow; grow on blocks or rafts. Mexico. C.



Fig. 691.—*Cattleya Skinnerii*.

C. Dowiana. Flowers among the largest; buff-yellow, with yellow-veined dark-crimson lip; very fragrant. Costa Rica. I.

C. Dowiana, var. *aurea* (*C. aurea*). Antioquia. I.

C. Eldorado. Flowers pale-rose, with yellow and crimson lip. Brazil. I.

C. Eldorado, var. *Wallisii*. White, with orange throat. I.

C. granulosa. Stems reed-like. Sepals and petals greenish, spotted brown; lip crimson and white. Brazil. I.

C. guttata. Flowers greenish, spotted brown; lip rose-purple. Brazil. I.

C. intermedia. Flowers pale-pink, lip crimson. Brazil. I.

C. labiata. The largest and showiest of the *Cattleyas*. Botani-

cally it includes *C. Gaskelliana*, *C. Mossiae*, *C. Mendelii*, *C. Percivaliana*, *C. Trianae*, and others, all of which are abundantly distinct for garden purposes, especially as they flower at different seasons. All have large rose-and-crimson flowers, and there are pure-white forms. The type, or autumn-flowering form, was introduced in 1818 from Brazil. I.

C. Lawrenceana. Flowers large, various shades of rose and crimson. British Guiana. I.

C. Loddigesii. Stems slender, 1 foot; flowers rose. Brazil. *C. Harrisoniae* is a form of it. I.

C. maxima. Flowers large, rosy-lilac, with crimson-veined lip; often ten or twelve on a spike. Guayaquil. I.

C. Schilleriana. Tall stems, with large spotted brown-and-purple flowers. Brazil. I.
C. Skinnerii (fig. 691). Flowers in fine heads, bright-rose. There is a white variety. Guatemala. I.
C. superba. Short stems, with rose-purple flowers. British Guiana. W.
C. Walkeriana (*bulbosa*). Brazil. I.
C. Warscewiczii. Flowers often larger than *C. labiata*; rose and crimson. Also called *C. gigas*. Colombia. I.

Hybrids of garden origin:—

C. Atlanta. Leopoldii × Warscewiczii. 1894.
C. calumnata. Intermedia × Aclandiae. 1884.
C. Chamberlainiana. Leopoldii × Dowiana aurea. 1881.
C. Hardyana. Warscewiczii × Dowiana aurea. 1885.
C. Mantinii. Bowringiana × Dowiana aurea. 1895.
C. Maronii. Velutina × Dowiana aurea. 1898.
C. O'Brieniana. Loddigesii × Walkeriana. 1890.
C. Sedenii. Lawrenceana × Percivaliana. 1898.
C. Victoria Regina. Leopoldii × labiata. 1892.
C. Weedoniensis. Mendelii × granulosa. 1899.
C. Wendlandii. Bowringiana × Warscewiczii. 1894.
C. Whitei. Schilleriana × labiata. 1882.
C. Wm. Murray. Mendelii × Lawrenceana. 1893.

Chysis.—Showy epiphytes with thick fusiform pseudobulbs and simple racemes of large wax-like flowers.

C. aurea. Yellow, with crimson marks on lip. Venezuela. I.
C. bractescens. White, with yellow streaks on lip. Mexico. I.
C. levis. Yellow, with red streaks on lip. Mexico. I.
C. Linnminghei. White, tipped with rose. Mexico. I.

Cirrhopetalum.—Allied to Bulbophyllum, with very singular flowers of quaint forms.

C. O'Brienianum. Flowers in umbels, pale-yellow and crimson. I.
C. picturatum. Flowers yellow and purple. Burma. I.
C. Rothschildianum (fig. 692). The handsomest of the genus. Flowers 6 inches long, dark-crimson. Darjeeling. I.
C. Thouarsii. Yellowish, spotted rose or purple. Mascarene Islands. W.

Cochlioda.—A small genus, some of the members of which have been included in Mesospinidium. *C. Noezliana* has orange flowers, and *C. vulcanica*, carmine. C.

Cœlogyne.—A noble genus inhabiting India, Malaya, and China, often at high elevations, and embracing many garden favourites. It may be divided mainly into two sections, viz. true Cœlogyne, of which *C. cristata* is a good example, and Pleiones, which include *C. lagenaria*, *C. maculata*, *C. Wallichiana*, &c., frequently known as Indian Crocuses. They require abundance of water while growing, and a distinct dry resting season. The bulk of the true Cœlogyne are evergreen.

C. asperata. A very large white species. Malay Archipelago. W.
C. barbata. White, with blackish lip. India. C.
C. corrugata. Wrinkled bulbs, white and orange flowers. India. C.
C. cristata. White, with yellow base to lip. The variety *alba* or *hololeuca* is all white. India. I.
C. Dayana. Long drooping racemes of brownish flowers. Borneo. Grow in baskets. W.
C. Gardneriana. Racemes pendulous; white, with yellow on lip. Khasia Hills. C.
C. Massangeana. A fine species for baskets, with cream and brown flowers. India. I.
C. ocellata. White and orange flowers. India. C.
C. pandurata. A noble species, with racemes of large emerald-green and black flowers. Borneo. W.
C. Sanderiana. A grand species of the *C. cristata* class. Malaya. W.
C. Wallichiana. This with *C. humilis*, *C. maculata*, and several others, form the Pleione section. All have lilac, rose, or white flowers, marked with yellow and crimson on the lip. Himalayas. C.

Cycnoches.—Singular plants requiring the same treatment as Catasetum and Mormodes, viz., abundance of water while growing, and a cool dry rest after. The best-known species are *C. chlorochilon* (the Swan Orchid),

cream-yellow, *C. Loddigesii*, and *C. Peruviana*. All are remarkable for the dissimilarity between their male and female flowers. Chiefly from South and Central America. I.

Cymbidium.—Sturdy evergreen plants, among which are some of our handsomest garden Orchids.

C. Devonianum. Flowers in pendulous racemes; greenish, spotted purple, lip purplish-crimson. Khasia Hills. I.
C. eburneum. Very large, white, often marked with yellow and purple on the lip. Khasia Hills. I.
C. giganteum. Himalaya. I.
C. grandiflorum (*Hookerianum*). Himalaya. I.
C. Lowianum. Flowers green, with red-brown lip. Burma. I.
C. Traceyanum. A supposed natural hybrid between *C. grandiflorum* and *C. giganteum*; one of the handsomest. Burma. I.



Fig. 692.—*Cirrhopetalum Rothschildianum*.

Hybrids of garden origin:—

C. eburneo-Lowianum. Eburneum × Lowianum. 1889.
C. Winnianum. Giganteum × eburneum. 1893.

Cyperorchis.—A section of Cymbidium, including *C. Mastersii* and *C. elegans*, both white-flowered and Burmese. I.

Cypripedium.—A very large genus, comprising too many species to admit of their being fully enumerated here, and forming one of the most fertile fields of work for the raiser of garden hybrids. There are two distinct sections which should be kept botanically distinct, viz. the Cypripedium proper of the *C. barbatum* and *C. insigne* class; and the Selenipedium of South America, with shining green leaves and structural difference of the ovary; of these *S. caudatum* is a familiar example. There is also

a third natural section which our native *C. Calceolus* and the hardy North American *C. spectabile* (fig. 693) serve to

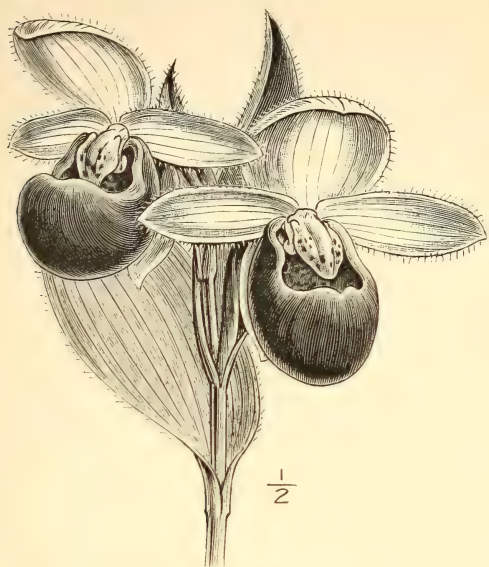


Fig. 693.—*Cypripedium spectabile*.

illustrate. (See also *Selenipedium*.) The following is a good selection:—

- | | |
|--|---|
| <i>C. barbatum</i> . Mount Ophir. I. | <i>C. Mastersianum</i> . Malaya. W. |
| <i>C. bellatulum</i> (fig. 694). Shan States. I. | <i>C. niveum</i> . Penang. I. |
| <i>C. Charlesworthii</i> . Shan States. I. | <i>C. philippinense</i> . Philippines. W. |
| <i>C. concolor</i> . Moulmein. I. | <i>C. Rothschildianum</i> . N. Guinea. W. |
| <i>C. Curtisii</i> . Sumatra. W. | <i>C. Sanderianum</i> . Malay Archipelago. W. |
| <i>C. Fairieanum</i> . Assam. C. | <i>C. Spicerianum</i> . Assam. I. |
| <i>C. Godefroyae</i> . Cochinchina. W. | <i>C. Stonei</i> . Borneo. W. |
| <i>C. insigne</i> . Northern India. C. | <i>C. venustum</i> . Sylhet. I. |
| <i>C. Lawrenceanum</i> . Borneo. W. | <i>C. villosum</i> . Moulmein. I. |
| <i>C. Lowii</i> . Borneo. W. | |



Fig. 694.—*Cypripedium bellatulum*.

Hybrids of garden origin:—

- C. Arthurianum*. Insigne × Fairieanum. 1874.
C. Aylingii. Niveum × ciliolare. 1890.
C. Burfordiense. Argus × philippinense. 1888.
C. Calypso. Spicerianum × Boxallii. 1891.
C. Chas Richman. Barbatum × bellatulum. 1893.

- C. Conco-Lawre*. Concolor × Lawrenceanum. 1893.
C. H. Ballantine. Fairieanum × purpuratum. 1890.
C. Juno. Callosum × Fairieanum. 1891.
C. Lecanum. Insigne × Spicerianum. 1884.
C. Massaianum. Superciliare × Rothschildianum. 1893.
C. Morganæ. Stonei × superbiens. 1880.
C. Niobe. Spicerianum × Fairieanum. 1890.
C. Swinburnei. Insigne Maulei × Argus. 1892.
C. T. B. Haywood. Superbiens × Drurii. 1889.
C. Vexillarium. Barbatum × Fairieanum. 1870.
C. Watsonianum. Harrisianum × concolor. 1893.

Dendrobium.—An extensive and showy genus of epiphytes, among the most useful for gardens. The deciduous species, such as *D. nobile*, require a long rest after growth; the intermediate evergreen species, such as *D. densiflorum*, a shorter rest in a cool place, but not to be severely dried; and the warm-house species to be retained in a fairly warm temperature, even while resting, the necessary check being given by withholding water after the growths are matured.



Fig. 695.—*Dendrobium nobile*.

- | | |
|--------------------------------------|--|
| <i>D. aggregatum</i> . Burma. I. | <i>D. Findlayianum</i> . Burma. I. |
| <i>D. aureum</i> . India, Ceylon. I. | <i>D. formosum</i> . India. I. |
| <i>D. Bensoniæ</i> . Burma. I. | <i>D. infundibulum</i> . India. I. |
| <i>D. bigibbum</i> . Australia. W. | <i>D. lituiflorum</i> . India. I. |
| <i>D. Brymerianum</i> . Burma. I. | <i>D. MacCarthiae</i> . Ceylon. W. |
| <i>D. chrysanthum</i> . India. I. | <i>D. Macfarlanei</i> (Johnsonæ). New Guinea. W. |
| <i>D. chrysotoxum</i> . Burma. I. | <i>D. moschatum</i> . India. I. |
| <i>D. crassinode</i> . Arracan. I. | <i>D. nobile</i> (fig. 695). India and China. I. |
| <i>D. Dalhousianum</i> . Burma. I. | <i>D. Phalænopsis</i> . N. Guinea. W. |
| <i>D. Dearei</i> . Philippines. W. | <i>D. superbiens</i> . Australia. W. |
| <i>D. densiflorum</i> . Nepaul. I. | <i>D. thyrsoiflorum</i> . Burma. I. |
| <i>D. Devonianum</i> . India. I. | <i>D. Wardianum</i> (fig. 696). India. I. |
| <i>D. Falconeri</i> . India. I. | |
| <i>D. Farmeri</i> . Himalaya. I. | |
| <i>D. fimbriatum</i> . Nepal. I. | |

Hybrids of garden origin:—

- D. Ainsworthii*. Aureum × nobile. 1874.
D. Aspasia. Aureum × Wardianum. 1893.
D. chlorostele. Linawianum × Wardianum. 1887.
D. Euryclea. Lituiflorum × Wardianum. 1892.
D. Murrhiniacum. Wardianum × nobile. 1888.
D. rhodostoma. Huttonii × sanguinolentum. 1876.
D. Sibyl. Bigibbum × Linawianum. 1893.
D. Venus. Falconeri × nobile. 1889.
D. Virginia. Bensoniæ × moniliforme. 1894.
D. Wiganæ. Signatum × nobile. 1896.

Disa.—Terrestrial Orchids, chiefly South African, among which are many handsome species, which, however,

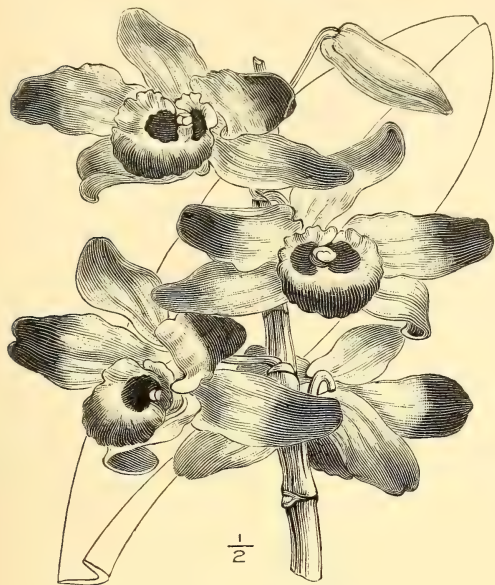


Fig. 696.—*Dendrobium Wardianum*.

are difficult to cultivate. *D. grandiflora* (fig. 697) is one of the most lovely scarlet Orchids known; it should be grown as a marsh plant in boggy peat in a cold airy greenhouse. It forms the type of the leafy evergreen section,



Fig. 697.—*Disa grandiflora*.

all of which require similar treatment; as *D. graminifolia* does of the grassy-leaved, which require to be kept warm and dry during the winter while at rest. Of the leafy evergreen class *D. grandiflora*, scarlet; *D. tripetaloides*,

white and purple; *D. racemosa*, rose-red; *D. crassicornis*, white and purple; and *D. longicornu*, white or blue, are the handsomest: of the grassy-leaved, *D. graminifolia*, blue; *D. lacera*, blue; *D. lugens*, blue and green; *D. porrecta*, orange; and *D. pulchra*, a magnificent species resembling a *Gladiolus*, lilac and rose.

There are also several beautiful hybrids between the leafy evergreen species, viz. *D. Kewensis*, *D. Veitchii*, *D. Premier*, &c.

Epicattleya (*Epidendrum* × *Cattleya*):—

E. guatemalensis. *E. cinnabarina* × *C. Skinnerii*. 1861.
E. Mrs. J. O'Brien. *E. O'Brienianum* × *C. Bowringiana*. 1899.
E. radiato-Bowringiana. *E. radiatum* × *C. Bowringiana*. 1898.

Epidendrum.—A very large and widely-distributed genus, many of the species being showy, while others are



Fig. 698.—*Epidendrum vitellinum*.

only of botanical interest. One of the handsomest, *E. bicornutum*, which bears large heads of fine wax-like white flowers, and others of that section, are now placed as a separate genus under *Diacrium*.

E. atropurpureum (*macrochilum*). Rose, purple, and white. South and Central America. I.
E. aurantiacum. Orange. Guatemala. I.
E. ciliare. White, fragrant at night. Tropical America. I.
E. dichromum. Rose with purple lip. Brazil. I.
E. Endresii. Small stems; white, violet spots. Costa Rica. I.
E. nemorale. Rosy-mauve, streaked purple. Mexico. I.
E. oncidoides. Yellow and brown. South America. I.
E. prismatocarpum. Green, chocolate, and rose. Chiriqui. I.
E. pseudepidendrum. Green and scarlet. I.
E. radicans (*rhizophorum*). Scarlet. Guatemala. I.
E. Schomburgkii. Vermilion. Guiana. I.
E. Stamfordianum. Yellow, purple. Guatemala. I.
E. vitellinum (fig. 698). Orange. Mexico. I.
E. Wallisii. Yellow and purple. Colombia. I.

Hybrids of garden origin:—

- E. Endresio-Wallisii*. Wallisii × Endresii. 1892.
E. Langleyense. Pseudepidendrum × Wallisii. 1899.
E. O'Brienianum. Erectum × radicans. 1888.
E. Wallisio-ciliare. Wallisii × ciliare. 1895

Fig. 699.—*Lælia anceps*.*Epilælia* (*Epidendrum* × *Lælia*):—

- E. Charlesworthii*. *E. radicans* × *L. cinnabarina*. 1899.
E. Hardyana. *E. ciliare* × *L. anceps*. 1894.
E. radico-purpurata. *E. radicans* × *L. purpurata*. 1897.

Epiphronitis (*Epidendrum* × *Sophranitis*):—

- E. Veitchii*. *E. radicans* × *S. grandiflora*. 1890.

Eriopsis.—A small genus requiring to be grown in a warm sunny house. The handsome purple-yellow and white *E. rutidobulbon* is the best-known. I.

Esmeralda.—A section of *Vanda* formed with *E. Cathcartii* as a basis, and according to some authorities embracing *Vanda Sanderiana*. I.

Eulophiella.—A Madagascar genus, of which the only known representatives are the fine white *E. Elisabethæ* and the gigantic *E. Pectersiana*. They require great heat and moisture. W.

Grammatophyllum.—A small genus of noble tropical epiphytes, ornamental in growth and showy in flower. *G. speciosum* is one of the largest-growing Orchids known, but a shy flowerer.

- G. Ellisii* (*Grammangis*). Brown and yellow. Madagascar. W.
G. Fenzlianum. Green and chocolate. Malaya. W.
G. multiflorum. Brown, green, and yellow. Philippines. W.
G. speciosum. Yellow and red. Malaya. W.

Habenaria.—A large genus of terrestrials, many of which are hardy. The tropical species are *H. militaris*, scarlet; *H. carnea*, bluish-white; *H. c. nivosa*, white; *H. rhodocheila*, scarlet; and the large white *H. Susanneæ*.

Houlletia.—A singular genus from Brazil and Colombia, of which the large yellow and purple *H. Brocklehurstiana* is the best known. I.

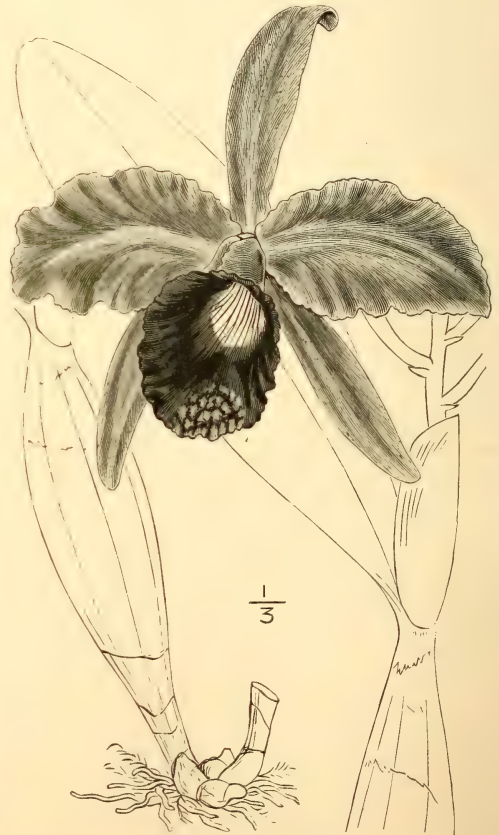
Lælia.—This showy genus vies with *Cattleya* in popular favour, and by crossing the two genera many

showy hybrids have been produced. All require the intermediate house, the Mexican species should be grown in full sunlight, the others lightly shaded during the height of summer.

- L. albida*. White, rose. Mexico. I.
L. anceps (fig. 699). Rose and purple. Mexico. Of this there are a great number of varieties, ranging from pure-white to the brightly-coloured typical form. Of these *alba*, *Dawsonii*, *Sanderiana*, and *Stella* are the best. I.
L. autumnalis. Rose and white. Mexico. I.
L. crispa. White, purple, and yellow. Brazil. I.
L. Digbyana (*Brassavola*). White. Honduras. I.
L. grandis. Yellow, white, and purple. Bahia. I.
L. harpophylla. Orange. Brazil. I.
L. majalis. Rose and white. Mexico. I.
L. monophylla. Orange-scarlet. Jamaica. I.
L. Perrini. White and purple. Brazil. There are white varieties of this also. I.
L. præstans. Rose and crimson. Brazil. I.
L. pumila. Rose and crimson. South America. I.
L. purpurata (fig. 700). White, lilac, and purple. Brazil. I.
L. superbiens. Rose. Guatemala. I.
L. tenebrosa. Brown, white, and purple. Bahia. I.

Hybrids of garden origin:—

- L. Digbyano-purpurata*. *Digbyana* × *purpurata*. 1898.
L. Latona. *Cinnabarina* × *purpurata*. 1892.
L. Olivia. *Crispa* × *xanthina*. 1897.
L. Oweniana. *Dayana* × *xanthina*. 1892.
L. splendens. *Purpurata* × *crispa*. 1898.
L. vitellina. *Harpophylla* × *Perrini*. 1893.

Fig. 700.—*Lælia purpurata*.

Lælio-Cattleya.—The name given to hybrids between *Lælia* and *Cattleya* whether natural and imported or home-raised. The most familiar are:—

- L. Aphrodite*. *L. purpurata* × *C. Mendelii*. 1896.
L. Baroness Schroder. *L. Jongheana* × *C. Trianaei*. 1892.

L. Callistoglossa. *L. purpurata* × *C. Warscewiczii*. 1884.
L. Canhamiana. *L. purpurata* × *C. Mossiae*. 1885.



Fig. 701.—*Masdevallia Chimera*.

L. Clive. *L. præstans* × *C. Dowiana aurea*. 1896.
L. Digbyano-Mossiae. *L. Digbyana* × *C. Mossiae*. 1889.
L. Ernestii. *L. flava* × *C. Percivaliana*. 1899.
L. eximia. *L. purpurata* × *C. labiata* Warnerii. 1890.
L. Hippolyta. *L. cinnabarina* × *C. Mossiae*. 1890.
L. Lady Rothschild. *L. Perrini* × *C. Warscewiczii*. 1895.
L. Nysa. *L. crispa* × *C. Warscewiczii*. 1893.
L. Pallas. *L. crispa* × *C. Dowiana*. 1889.
L. Veitchiana. *L. crispa* × *C. labiata*. 1874.
L. Wellsie. *L. purpurata* × *C. labiata*. 1894.
L. Zephyra. *L. xanthina* × *C. Mendelii*. 1894.

Lycaste.—A useful genus from tropical America, requiring to be grown in the cool end of the intermediate house.

L. aromatica. Yellow. Mexico. I.
L. costata. Ivory-white. Peru. I.
L. cruenta. Yellow. Guatemala. I.
L. Deppei. Green, brown, and yellow. Mexico. I.
L. plana. Green, brown, crimson. Bolivia. I.
L. Skinneri. White to rose and crimson. Guatemala. I.

Masdevallia.—A dwarf leafy evergreen genus, chiefly inhabiting the mountains of South America, and includ-

ing some of the most quaint and singular as well as the most brilliant-flowered of Orchids. All require to be kept moist all the year. The *Chimera* class grow best in baskets.

M. bella. Cream, white, purple. Colombia. I.
M. Chimera (fig. 701). Yellow and purple. Colombia. I.
M. coccinea (*Harryana*). Scarlet. Pamplona. C.
M. Davisii. Yellow. Peru. C.
M. Ephippium. Yellow, purple. Ecuador. C.
M. Estradæ. Yellow and mauve. Colombia. C.
M. hieroglyphica. Purple. Colombia. C.
M. ignea (fig. 702). Orange-scarlet. Colombia. C.
M. macrura. Yellow and purple. Colombia. C.
M. Mooreana. Green and purple. Colombia. C.
M. O'Brieniana. Yellow and crimson. C.
M. racemosa (*Crossii*). Bright-scarlet. Popayan. C.
M. rosea. Rose. Ecuador. C.
M. Schlimii. Yellow and red. Colombia. C.
M. Tovarensis. White. Venezuela. C.
M. Veitchiana. Orange and mauve. Peru. C.

Hybrids of garden origin:—

M. Chelsoni. *Veitchiana* × *amabilis*. 1880.
M. Courtauldiana. *Rosea* × *caudata*. 1889.
M. Curlei. *Macrura* × *Tovarensis*. 1896.
M. Gairiana. *Veitchiana* × *Davisii*. 1884.
M. Kimballiana. *Veitchiana* × *Shuttleworthii*. 1893.
M. Rushtonii. *Ignea* × *racemosa*. 1893.
M. Veitchiano-Estradæ. *Veitchiana* × *Estradæ*. 1893.

Maxillaria.—A large genus, very easy to cultivate. The following are the showiest and most useful:—

M. grandiflora. White. Ecuador. I.
M. picta. Cream, white, and purple. Brazil. I.
M. præstans. Yellow and red. Guatemala. I.
M. Sanderiana. White and purple. Ecuador. I.
M. tenuifolia. Red-brown. South America. I.
M. venusta. White. Colombia. I.

Miltonia.—Now that this genus includes *Odontoglossum vexillarium*, *O. Roezlii*, and *O. Phalenopsis*, it embraces a very varied group of decorative Orchids. The Brazilian species require the shady side of the Cattleya



Fig. 702.—*Masdevallia ignea*.

house in a position near the roof-glass. Those from Colombia prefer a more moist and less airy situation.

- M. candida*. Yellow, brown, white, and purple. Brazil. I.
M. Clowesii. Yellow, brown, and purple. Brazil. I.
M. cuneata. White and purple. Brazil. I.
M. Endresii (*Odontoglossum Warscewiczii*). White and rose.
 Central America. I.
M. Phalænopsis. White and purple. Colombia. W.
M. Regnellii. White and purple. Brazil. I.
M. Roezlii. White, yellow, and purple. Colombia. W.
M. Schroderiana. White, crimson, and brown. Costa Rica. I.
M. spectabilis. White and rose. Brazil. I.
 „ var. *Moreliana*. Rose and purple. Brazil. I.
M. vexillaria (fig. 703). White and crimson. Colombia. I.

Mormodes.—A singular genus of the same general habits and requirements as *Catasetum* and *Cynoches*, and exhibiting similar structural peculiarities in the flowers. I.

Odontoglossum.—A favourite genus with generally showy flowers. The most beautiful and varied is *O. crispum*, the varieties of which are very numerous.

- O. blandum*. White and purple. Colombia. C.
O. Cervantesii. White, red, and yellow. Mexico. C.
O. cirrhosum. White and purple. Ecuador. I.
O. citrosimum. White and rose. Mexico. I.



Fig. 703.—*Miltonia vexillaria*.

- O. cordatum*. Brown, yellow, and white. Mexico. C.
O. coronarium. Brown and yellow. Colombia. C.
O. crispum (figs. 704, 705). White and various. Bogota. C.
O. Edwardii. Violet. Ecuador. C.
O. grande (fig. 706). Yellow and brown. Guatemala. C.
O. Hallii. Brown, yellow, and white. Ecuador. C.
O. Harryanum. Yellow, chocolate, and purple. Colombia. C.
O. Insleyii. Yellow and brown. Mexico. C.
O. Kramerii. Rose. Costa Rica. I.
O. Londesboroughianum. Yellow. Mexico. C.
O. luteo-purpureum. Colombia. C.
O. nævium. Colombia. C.
O. nebulosum. White and brown. Mexico. C.
O. Oerstedii. White. Costa Rica. C.
O. Pescatorei. White and purple. Colombia. C.
O. polyanthum. Yellow and brown. Ecuador. C.
O. pulchellum. White. Guatemala. C.
O. ramossissimum. White and purple. Colombia. C.
O. Rossii. White, brown, and rose. Mexico. C.
O. triumphans. Yellow and brown. Colombia. C.
O. Uroskinneri. White, brown, and rose. Guatemala. C.

Of the natural hybrid *Odontoglossums*, *excellens*, a hybrid of *Pescatorei*, *Wilckeanum* (*crispum* × *luteo-purpureum*), *elegans* (*cirrhosum* × *cristatum*), and *mulus*

(*odoratum* × *luteo-purpureum*) are among the showiest. There are also several artificially-raised hybrids.

Oncidium.—A large genus of epiphytes inhabiting chiefly Central and South America, and composed of groups very dissimilar in growth and flower, from the fleshy terete-leaved *O. Jonesianum* to the broad succulent-leaved *O. Lanceanum*, both of which sections exhibit little trace of pseudo-bulbs, to the large-bulbed *O. macranthum* and *O. tigrinum*; from the miniature *O. Limminghei* to the stately *O. ampliatum majus*. Whilst some prefer the cool house others thrive best in heat. All, however, may be grown in an intermediate house.

- O. bicallosum*. Yellow. Guatemala. I.
O. bifolium. Yellow and brown. Monte Video. I.
O. Cavendishianum. Yellow, brown spots. Guatemala. I.
O. Cebolleta. Rush-leaved; flowers yellow. Brazil. I.
O. cheirophorum. Yellow. Chiriqui. C.
O. concolor. Yellow. Organ Mountains. C.
O. crispum. Yellow and brown. Organ Mountains. C.
O. cucullatum. Rose and purple. Ecuador. C.
O. curtum. Yellow and brown. Organ Mountains. C.
O. dasytyle. Pale-yellow and chocolate. Organ Mountains. C.
O. flexuosum. Yellow. Brazil. I.



Fig. 704.—*Odontoglossum crispum* (white form).

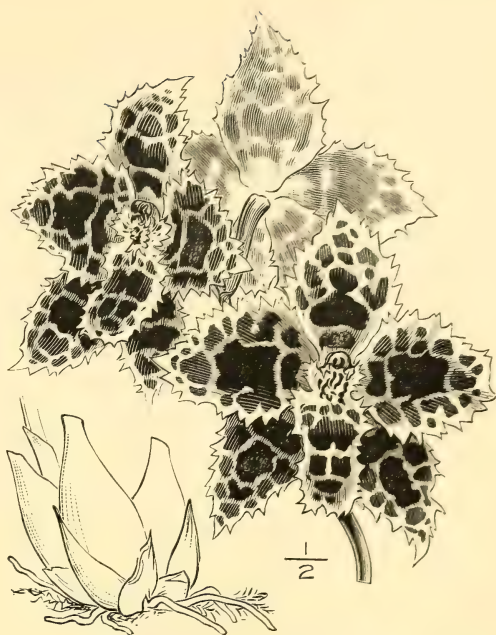


Fig. 705.—*Odontoglossum crispum* (spotted).



Fig. 706.—*Odontoglossum grande*.

- O. Forbesii*. Yellow and brown. Organ Mountains. C.
O. Gardneri. Yellow and brown. Organ Mountains. C.
O. incurvum. Rose and white. Mexico. C.
O. Jonesianum. White and brown. Paraguay. I.
O. Kramerianum. Yellow and chestnut-red. Ecuador. W.

Fig. 707.—*Oncidium Papilio*.

- O. Lanceanum*. Rose-purple and brown. Surinam. W.
O. leucochilum. White and brown. Guatemala. C.
O. Loense. Orange, green, and brown. Loxa. C.
O. macranthum. Yellow and purple. Ecuador. C.
O. Marshallianum. Bright-yellow. Organ Mountains. C.
O. ornithorhynchum. Rose-purple. Mexico. C.
O. ornithorhynchum album. White. C.
O. Papilio (fig. 707). Yellow and red-brown. Trinidad. W.
O. Phalænopsis. White and purple. Ecuador. C.
O. sarcodes. Yellow and brown. Organ Mountains. C.
O. serratum. Brown. Ecuador. C.
O. splendidum. Yellow and brown. Guatemala. C.
O. superbiens. White, brown, and purple. Colombia. C.
O. tigrinum. Yellow and brown. Mexico. C.
O. varicosum. Yellow, red-brown spots; very fragrant. Brazil. C.
O. Wentworthianum. Yellow and brown. Guatemala. C.

Peristeria.—A small genus rendered familiar in gardens through *P. elata*, the Dove Plant. They require the same treatment as *Lycaste* and *Phaius*. The stronger growers should have fibrous loam, peat, and sphagnum.

- P. aspersa*. Yellow and chocolate. Venezuela. I.
P. cerina. Yellow. Central America. I.
P. elata. White. Panama. I.
P. pendula. French-white and purple. Demerara. I.

Pescatorea.—A sub-genus of leafy evergreen Orchids producing showy flowers. They require to be grown in a moist shady house. *Pescatorea* is botanically placed under *Zygoptalum*.

- P. cerina*. Yellow. Veragua. W.
P. Dayana. Cream-white. Colombia. W.
P. Klabochorum. White and crimson. Ecuador. W.
P. Lehmannii. White and violet. Colombia. W.

Phaius.—A variable genus related to *Calanthe*, the two having been hybridized successfully.

- P. grandifolius*. Buff and purple. India and China. I.
P. Humblotii. White and rose. Madagascar. W.
P. maculatus. Yellow. India. C.

P. tuberculosus (fig. 708). White, yellow, and purple. Madagascar. W.

P. Wallichii. White, buff, and purple. India. I.

Hybrids of garden origin:—

- P. amabilis*. *Grandifolius* × *tuberculosus*. 1893.
P. Cooksoni. *Tuberculosus* × *Wallichii*. 1890.
P. maculato-grandifolius. *Maculatus* × *grandifolius*. 1890.
P. Marthaæ. *Blumei* × *tuberculosus*. 1893.
P. Norman. *Sanderianus* × *tuberculosus*. 1898.
P. Oakwoodensis. *Humblotii* × *Cooksoni*. 1900.

Phalænopsis.—A noble genus with short stems furnished with fleshy sheathing leaves, which in the case of *P. Schilleriana* are prettily marbled with gray. They are known as Moth Orchids, and are among the showiest Orchids in cultivation.

- P. amabilis* (*grandiflora*) (fig. 709). White. Java. W.
P. Aphrodite (*amabilis*). White. Manila. W.
P. Lowii. Rose and purple. Burma. W.
P. Luddemanniana. White and purple. Philippines. W.
P. rosea. Rose. Manila. W.
P. Sanderiana. White and rose. Philippines. W.
P. Schilleriana. Rose. Manila. W.
P. speciosa. White and crimson. Malaya. W.
P. Stuartiana. White and brown. Mindanao. W.
P. tetraspis. White. Andaman Isles. W.
P. violacea. White and violet. Sumatra. W.
 „ var. *Schroderiana*. Rose. W.

There are also several beautiful hybrids.

Platyclinis.—A small genus of which the pretty and elegant yellow *P. filiformis* and the white *P. glumacea*

Fig. 708.—*Phaius tuberculosus*.

are best known. They were formerly called *Dendrochilum*. I.

Restrepia.—Dwarf evergreen Orchids of similar

habit to *Masdevallia*. The quaint insect-like flowers of *R. antennifera* are very attractive. C.

Rodriguezia.—A small genus of dwarf evergreen epiphytes, more commonly known in gardens as *Burlingtonia*.

- R. candida*. White. Demerara. I.
R. decora. White and brown. Brazil. I.
R. pubescens (*Lindenii*). White. Pernambuco. I.
R. secunda. Cherry-red. Trinidad. I.
R. venusta (*fragrans*). White and yellow. Brazil. I.

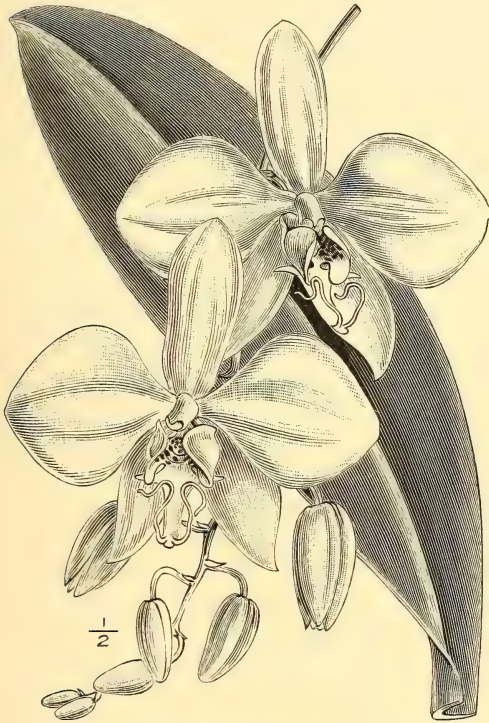


Fig. 709.—*Phalaenopsis amabilis*.

Saccolabium.—Evergreen plants with fleshy distichous leaves. The section including *S. caeleste*, and the forms of *S. retusa* known in gardens as *S. guttatum*, *S. Blumei*, and *S. præmorsum*, are now placed under *Rhyncostylis*.

- S. ampullaceum*. Rose, spotted crimson. Himalaya. I.
S. bellinum. White, purple, and yellow. Burma. I.
S. caeleste. Blue. Siam. I.
S. curvifolium. Orange. India. I.
S. giganteum. White and crimson. Burma. I.
S. guttatum. White and rose. Java. I.
S. Hendersonianum. Rose. Borneo. W.
S. violaceum. White and rose. Manila. I.
 „ var. *Harrisonæ*. White. I.

Selenipedium.—A showy and singular genus from South and Central America, generally included in gardens with *Cypripedium*, although structurally different. The foliage is bright-green, and the petals of most of the species are curiously prolonged.

- S. Boissierianum*. White and green. Peru. W.
S. caudatum. Yellow, white, brown. Ecuador, Peru. I.
S. Lindleyanum. Pale-green, red-brown. Guiana. W.
S. longifolium. Green, white, brown. South America. W.
S. Schlimii. White-rose. Ocaña. C.

Hybrids of garden origin:—

- S. cardinale*. *Sedenii* × *Schlimii* albiflorum. 1882.
S. Dominicanum. *Caricinum* × *caudatum*. 1870.
S. grande. *Longifolium* × *caudatum*. 1881.
S. Schroderæ. *Caudatum* × *Sedenii*. 1883.

- S. Sedenii*. *Schlimii* × *longifolium*. 1873.
S. stenophyllum. *Schlimii* × *caricinum*. 1876.

Sobralia.—A noble genus with tall bamboo-like stems furnished with large and handsome plicate leaves and large generally fugacious flowers.

- S. leucozantha*. White and yellow. Costa Rica. I.
S. Liliastrum. White. Guiana. I.
S. macrantha. Rose and purple. Mexico. I.
S. xantholeuca. Yellow. Colombia. I.

There are several handsome hybrids of garden origin.

Sophranitis.—Dwarf evergreen epiphytes, of which the scarlet *S. grandiflora* is a general favourite. Like most very dwarf Orchids they thrive best in small pans or baskets suspended near the roof.

- S. cernua*. Red. Brazil. C.
S. grandiflora. Scarlet. Organ Mountains. C.
S. violacea. Violet. Organ Mountains. C.

Stanhopea.—Extraordinary plants producing pendulous spikes of large wax-like flowers. They require to be grown in suspended baskets.

- S. Bucephalus*. Yellow and red. Ecuador. W.
S. Devonensis. White and purple. Mexico. W.
S. eburnea. White. Trinidad. W.
S. insignis. Ivory-white and purple. Ecuador. W.
S. oculata. Yellow and red. Mexico. W.
S. tigrina. Yellow, chocolate, and crimson. Mexico. W.

Thunia.—A pretty genus with elegant growths, furnished with pendulous terminal heads of flowers, and in this particular well distinguished from *Phaius*, under which some authorities place it.

- T. alba*. White with crimson lines on lip. India. I.
T. Bensonica. Rose and purple. Rangoon. I.
T. Marshalliana. White and yellow. Burma. I.
T. Veitchiana (hybrid). I.

There are also other handsome garden-raised varieties.

Trichopilia (including *Helcia* and *Pilumna*).—Compact-growing epiphytes, with fragrant flowers.

- T. brevis*. White, yellow, and brown. Peru. I.
T. coccinea. White and red. Central America. I.
T. crispa. White and crimson. Central America. I.
T. fragrans (*Pilumna*). White and yellow. Colombia. I.
T. hymenantha. White and purple. Colombia. I.
T. marginata. Crimson and white. Chiriqui. I.
T. suavis. White and rose. Costa Rica. I.
T. tortilis. White and crimson. Mexico. I.

Vanda.—A very fine genus, graceful in growth, and showy in flower. The fine plants seen in gardens as *V. tricolor* and *V. suavis* are varieties of one species, *tricolor* having a yellow ground colour to the flowers, and *suavis* white.

- V. Amesiana*. White. Shan States. I.
V. Bensoni. Yellow and brown. Burma. I.
V. cœrulea. Blue. Khasia Hills. I.
V. cœrulescens. Blue. Burma. I.
V. Denisoniana. Ivory-white. Arracan Mountains. I.
V. Hookeriana. White, rose, and purple. Borneo. W.
V. insignis. White, yellow, and rose. Timor. I.
V. Kimballiana. White and purple. Shan States. I.
V. Lowii. Yellow and red. Borneo. This is botanically *Arachnanthe Lowii*; it is also known in gardens as a *Renanthera*. W.
V. Parishii. Yellow and brown. Burma. I.
 „ var. *Marriottiana*. Rose-purple. Burma. I.
V. Sanderiana. Rose and brown. Mindanao. W.
V. suavis. White, brown, and rose. Java. I.
V. teres (fig. 710). Rose, crimson, and yellow. India. W.
V. tricolor. Yellow, brown, and rose. Java. I.

Zygopetalum.—A showy genus in which modern botanists include *Promenæa*, *Bollea*, *Pescatorea*, and *Warszewiczella*, all of which, however, are distinct enough to warrant them being kept separate for garden purposes.

Z. (Batemannia) Burtii. White, yellow, and brown. Costa Rica. W.
Z. (Batemannia) meleagris. White, yellow, and brown. Brazil. W.
Z. Burkei. Green, white, and red. Guiana. I.
Z. crinitum. Green, brown, white, and purple. Brazil. I.
Z. grandiflorum. Green, brown, and purple. Colombia. I.

Z. Mackayii. White, green, and purple. Brazil. I.
Z. maxillare. Green, brown, and violet. Organ Mountains. I.
Z. rostratum. Greenish-brown and white. Demerara. I.

[J. O'B.]

Fig. 710.—*Vanda teres*.

CHAPTER XXXIII.

FERNS—STOVE AND GREENHOUSE.

GENERAL TREATMENT—INSECTS—ROCKERY—LIST OF
 FERNS—LYCOPODIUMS.

The directions given at page 199 for the construction of houses for stove and greenhouse plants may be followed in making provision for the cultivation of a collections of Ferns. Whatever modifications are necessary will depend chiefly on the object for which the Ferns are grown; if for general effect, then a large structure with ample provision for a moist atmosphere is to be recommended. Where space can be afforded, either in a portion of

a conservatory or in the shadiest house in a range, a collection of Ferns may be grouped on a low rockery in such a manner as to be a pleasing picture all the year round. Such an arrangement is shown in fig. 711, which represents a group of Ferns in a corner of the Great Temperate House at Kew. In many gardens Ferns are grown in combination with other decorative plants, readily adapting themselves to the conditions afforded in an ordinary plant-house.

Ferns in nature grow in shaded positions, because they thus obtain more moisture than when in positions exposed to the full influence of the sun. At the same time most of them enjoy bright light, even exposure to full sunlight, provided they have plenty of moisture

also. Some genera—for instance, *Nothochlæna*, *Cheilanthes*, and *Gleichenia*—are benefited by the drier air afforded by a rather sunny aspect. Filmy Ferns are happiest in a case with sliding lights in front, and fixed in the darkest and moistest corner of the house.

As much of the basement of the house as possible should be plain earth, covered with shell-gravel or shingle; quickly-drying walks formed of cement or hard tile being less suitable. Small rockeries under the staging, beside

the walks, and in spare corners, afford suitable conditions for some sorts, and they add a pleasing feature to the general effect.

Heating.—This should be done where possible by a sufficient quantity of 4-in. piping to ensure the keeping up of a uniform temperature of from 60° to 70° Fahr. In summer the heat outside would often cause the maximum named to be exceeded, and in winter the house may at times fall a few degrees lower, but it is best to be able to maintain the temperature stated,



Fig. 711.—Fernery in Greenhouse.

or a little more if necessary. It should also be observed that the temperature of the house at night should always be at least 5° to 10° lower than during the day.

Shading.—Thin canvas roller-blinds, running over supports which keep the canvas a few inches above the glass, form the best kind of roof-shading; or, the canvas can be nailed on for the summer, or a stipple put on the glass. Permanent shading should, however, be avoided if possible.

Ventilation.—This should be afforded at all seasons in such a way as to keep the atmosphere sweet without making it too dry. Ferns require pure air as much as other plants; the necessary humidity must be supplied by distributing water on the floors and beneath the stages. Ventilate the house at night as well as by day, regulating the ventilators by the conditions out of doors and by the peculiarities of the house.

Watering.—Ferns should never be allowed to get quite dry. The cultivator should be able to tell at once whether a plant is in active growth, or whether its growth is finished and its fronds hard and mature. It wants less water when in the latter state than it does whilst in active growth. At the same time no Fern should be kept constantly saturated; they are happiest when they are allowed the alternations between wetness and drought that are congenial to all plants grown under artificial conditions.

Soil.—Good fibrous yellow loam is the best soil for Ferns; peat and sand, formerly so largely used, being unnecessary for many species. Where, however, loam of the proper quality cannot be obtained, it is best to add one part peat, one of sharp sand, and one of good leaf-mould to three of loam. This will suit most Ferns. A smaller proportion of peat, sand, and leaf-mould may be added to the loam

for the strongest-growing kinds. The smaller *Nothochlæna*, *Cheilanthes*, *Pelleas*, &c., require less loam and more peat. Some cultivators mix crocks, charcoal, &c., with the compost.

Potting.—This operation, so far as the general collection is concerned, should be done in early spring, but with odd plants, or any which it is desired to repot at another time, it is only necessary to ascertain that the fronds are

mature, when it may be done with safety. Many of the larger species, and especially the rhizome-bearing *Davallias*, *Polypodiums*, &c., thrive for years undisturbed at the root. On the other hand, if the drainage has become defective, so that the soil is constantly wet, it is necessary to at once either renew the drainage or repot the plant. Overpotting is a prolific source of evil, and much discretion



Fig. 712.—*Nephrolepis rufescens tripinnatifida*.

is necessary to ensure that no larger pot is given than the rooting qualities of the plant will justify.

Insects.—Thrips and aphides are destructive enemies of Ferns, and these must be carefully looked for and kept under. Fumigating with tobacco-paper or such-like material is dangerous, often causing damage to the plants. There are, however, among new inventions, one or two appliances for raising nicotine vapour which are effective and safe. Where the evil is not very wide-spread, dipping the fronds of the smaller plants and washing those of the larger ones with weak tobacco-water or an infusion of quassia chips will help to keep the pest down. Scales also are injurious, and should be removed by sponging with some insecticide. Slugs, cockroaches, and woodlice should be carefully kept down.

Decorative Ferns are sorts that can be cultivated equally well either in a greenhouse or in a stove. Such are *Pteris serrulata* and *Pteris cretica*, in their many forms, which occupy the

first place among market Ferns. *Adiantum cuneatum* is grown in immense quantities; *A. gracillimum*, and a few other compact-growing species are also grown in more or less quantity. *Pteris tremula* is one of the best and freest. Other popular decorative Ferns are *Asplenium bulbiferum* and its varieties; *A. lucidum*, *A. flaccidum*, *Aspidium falcatum*, and its varieties *caryotideum* and *Fortunei*, *A. aristatum variegatum*, *A. capense*, *Gymnogramme japonica*, *G. ochracea*, *Nephrodium erythrosorum*, and the variety *prolificum*, *N. lepidum*, *Lomaria gibba*, *L. nuda*, *Onychium japonicum*, *Polypodium aureum*, *Pteris hastata*, *P. adiantoides*, *P. argyræa*, *P. longifolia*, and *P. semipinnata*, *Nephrolepis davallioides* and its vars. (fig. 712). Those who have to keep up a supply for the purposes of decoration will do well to grow batches of some of these.

Propagation by Spores.—Fertile fronds should be cut before the spore-cases open and put in their sorts in paper bags or packets, carefully naming them. They should then be placed in a

dry corner in one of the plant-houses directly over the hot-water pipes; or in a small cupboard placed on the pipes until they are wanted for sowing. Some growers put the fronds on a board resting on the hot-water pipes, and attribute their success in raising Ferns to the fact that they have almost baked the spores. In sowing the spores the cleverest operators do not always remember how minute they are. To receive the spores 5- or 6-inch pots or pans are best, and these should be well crocked and filled to within an inch and a half of the top with good fibry loam. Over this an inch layer of fine loam and peat should be placed, and well watered.

The spores may be sown next morning and the pots or pans placed each one in a saucer, which should be kept filled with water in order to keep the soil moist upwards. If the time can be spared it will be better not to use saucers, but to supply water when needed by plunging it into a tub kept for the purpose up to the rim, in such a manner that the soil is thoroughly wetted without causing any overflow from the surface of the soil. In any case, from the time of sowing until the plants are pricked out or potted, the pots should never once be allowed to get dry. The name of each kind should be written on the pot and not on a label, and each pot or pan should have a piece of glass placed on it to ensure evenness of temperature and prevent injury by drip. The most suitable place is a shelf on the shady side of a fairly warm and moist house, or a small propagating frame in a shady position would do; bottom-heat need not be used.

The best time to sow the spores is early in February, when they vegetate quickly. As soon as the prothallia can be manipulated they should be pricked off in little patches half an inch apart, using a light soil, and covering them again with glass. As soon as the small plants are fit to handle, as many as are wanted should be potted singly into thumb-pots and the store-pots left for future supply. Afterwards a 60-size pot should be given, and then the large 48 or 32 size, which is invariably the limit of the market Fern. In these beautiful plants are grown in from nine to twelve months.

Other methods are by pegging down the fronds of the viviparous species, such as *Asplenium bulbiferum*, on pans of soil into which the young plants will root; or if it is not desirable to cut the frond, the largest of the young plants may be removed and pricked off into store pots.

The common means of propagation is by dividing the crown or taking pieces of the rhizomes at potting time, and in all such cases the young plants merely require to be placed with the rest of the collection, no cutting-case or other extra protection being necessary.

Ferns for cutting.—The grower of Ferns for market has to arrange for uniform batches of saleable plants, to be raised, grown, and sold within a year. Those enumerated as being grown for market are especially useful for cutting. In gathering the fronds, only the hard, mature ones should be taken, the young and tender fronds being useless. They should be kept immersed in water until wanted; some of the kinds, especially the Maidenhairs, lasting much longer when cut the day before they are wanted, tied in bunches, and placed in rain-water for twenty-four hours.

Ferns for Wardian cases.—Decorative Ferns recommended above are the best for furnishing the glass cases in windows where the frost can be kept out, but where that cannot be done, the hardy evergreen sorts should be used. *Trichomanes radicans*, *Todea superba*, *T. pellucida*, and other Filmy Ferns, do remarkably well in Wardian cases in shady places in the dwelling-house, requiring good waterings at distant intervals, and to be kept close (no ventilation given) between the periods of watering.

Fern Rockery.—The houses in which Fern rockeries are arranged are generally heated to what is known as a greenhouse temperature, and which may be said to range between 45° and 65°. In some cases the whole of a glass structure adjoining the dwelling-house is arranged as a rockery and planted with ferns. For rockeries of this kind Tufa, or some other natural rock is best, cement being used to fix the pieces in position and to form the pockets. In planting, the pockets should have a good drainage of crocks, and, the plants selected for them should be good growers. *Begonia Rex*, *Ficus repens*, Selaginellas, &c., may be used to give variety.

Fern Walls.—In many plant-houses there is a back wall which it is desirable to cover, or in the rockery-house it may not be possible for want of space to furnish more than one or two sides with rock, and it is required to make the other walls uniform. This is easily accomplished by fixing wire netting standing out some two inches from the wall and stuffing the space between the wire and the wall with peat and sphagnum moss which, being well saturated with water, is afterwards planted

with small Ferns, Mosses, Begonias, &c. Some wall brackets, into which larger specimens can be planted, should be placed at the highest point to break the otherwise flat character of

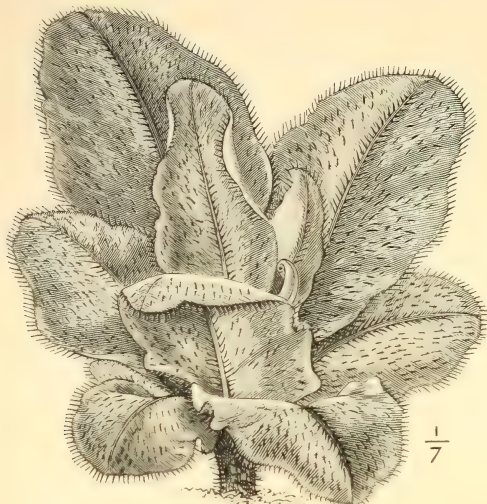


Fig. 713.—*Acrostichum crinitum*.

the arrangement. It takes a little time to get these walls well covered, but once they are established they give little trouble, and are a never-failing source for Fern-fronds for cutting.

[J. O'B.]

LIST OF STOVE AND GREENHOUSE FERNS.

ACROPHORUS. See *Davallia*.

ACROSTICHUM. — A large and heteromorphous genus, including *Chrysodium*, *Elaphoglossum*, &c. The fronds vary very much, but they are all alike in having the sori spread over the whole surface of the fertile or spore-bearing fronds. They are all tropical.

A. aureum.—Fronds pinnate, 2 to 6 feet in height; pinnæ lanceolate, brilliant-green; fertile pinnæ slightly contracted. Tropics generally.

A. caudatum.—Sterile fronds bipinnate, 2 to 3 feet long, 12 to 18 inches broad, the pinnules broad, dentate, bright-green; fertile frond with spike-like segments. West Indies.

A. (Hymenodium) crinitum (fig. 713).—Distinguished by its large simple fronds, and blackish sori, the fertile frond being more or less contracted. Sterile fronds ovate, 12 to 18 inches long, the upper side and edges and also the stipes clothed with long black hairs. West Indies, &c.

A. cuspidatum.—Sterile fronds linear-oblong, 6 to 8 inches long, densely clothed with golden-reddish chaffy scales. West Indies.

A. Herminieri, called the Eel Fern, has pendulous, coriaceous fronds, from 1 to 3 feet long, 2 to 3 inches broad, deep-green, shaded with a lustrous metallic blue. Trinidad.

A. osmundaceum.—Sterile fronds tripinnate, 2 to 3 feet long, the pinnules broad, deep-green; fertile fronds contracted. Tropical America.

A. (Rhipidopteris) peltatum (fig. 714).—A small, creeping, slender plant; fronds 3 inches long, scaly, the blade 2 inches wide, divided into numerous narrow segments; fertile frond smaller, two-lobed. Tropical America—

A. scolopendrifolium.—Fronds oblong-lanceolate, 12 to 18 inches long, pale-green, furnished on the margins and stipes with brown chaffy scales. Brazil.

A. squamosum.—Fronds elliptical, 4 to 6 inches long, clothed when young with large white chaffy scales, which become deep reddish-brown with age. West Indies, &c.

ADIANTUM.—This genus contains perhaps more truly beautiful and decorative species than any other. They are distinguished by their marginal sori, forked veins, with free venules, and in the majority black shining stipes and rachis.

A. æmulum.—Similar to *A. cuneatum*, less drooping and of a blue-green colour; pinnules obliquely oblong, with two to five sori on each; stipes black. Brazil.

A. aethiopicum.—Stipes black, 6 to 18 inches long; frond slender, loose, 1 to 2 feet long and wide; pinnæ $\frac{1}{2}$ inch across; sori in round patches. Var. *assimile* has fronds 9 to 12 inches long, the pinnules small, delicate-green. Tropics.

A. Bausei.—A hybrid between *trapeziforme* and *decorum*. Fronds 1 to 2 feet long; pinnæ triangular, deflexed, giving it a drooping aspect.

A. bellum.—A dwarf species of close-tufted habit; pinnæ small, brownish when young; stipes hair-like, black. Affined to *A. cuneatum*. Bermuda.

A. Capillus-Veneris.—There are several tender exotic varieties of this native hardy species. The best of them are *Mairisii*, *Moritzianum*, *imbriatum*, *grande*, *Fergusoni*, and *reginae*. G.

A. caudatum (fig. 715).—Frond pinnate, pendulous, proliferous at the apex; pinnæ downy, 6 to 18 inches long, of a gray-green colour. East Indies. Suitable for basket-culture.

A. Claesii.—Similar to *A. trapeziforme*, but the pinnules are streaked and flaked with white. Brazil.

A. colpodes.—Fronds tripinnate, 2 feet long, pinnules roundish in the young state, rich rosy-pink, changing with age to deep-green. Tropical America.

A. concinnum.—Fronds tripinnate, glabrous, membranous, spreading, 1 to 2 feet long, broadest in the middle;

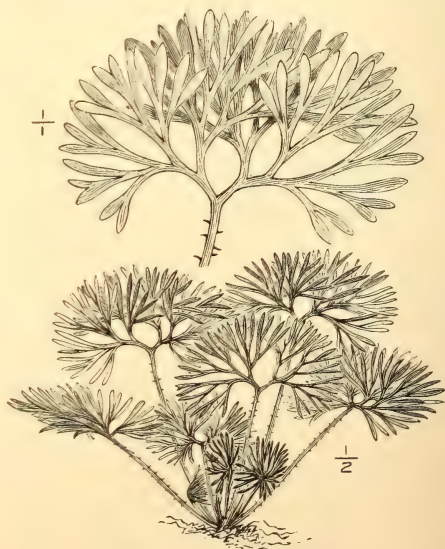


Fig. 714.—*Acrostichum peltatum*.

pinnules rhomboid, cuneate, bright-green. West Indies. The variety *Flemingii* is a dense-growing decorative plant; var. *latum* has wide somewhat twisted pinnæ.

A. cristatum.—Fronds bipinnate, triangular, lowest pair of pinnae again divided; pinnules dentate ovate; deep-green; stipes dull black, scabrous. Jamaica, &c.

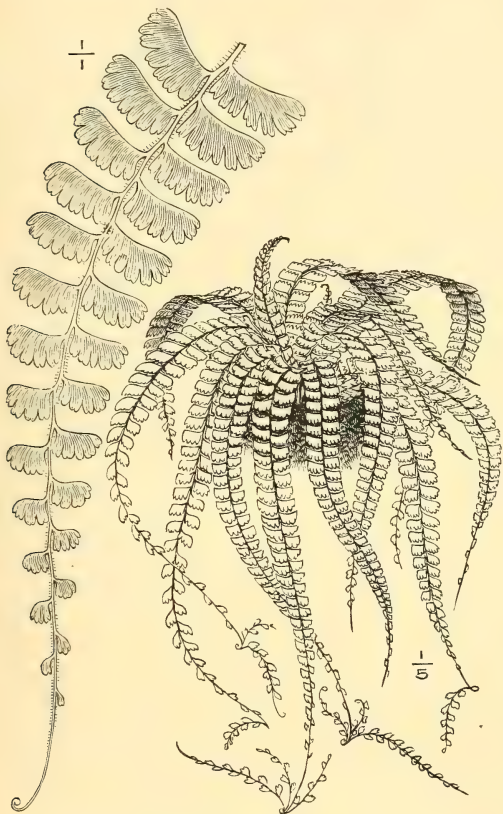


Fig. 715.—*Adiantum caudatum*.

A. cuneatum.—Fronds quadripinnate, 6 to 18 inches long, curving in a most elegant manner; the pinnules small, mostly wedge-shaped, deep-green; the stipes and rachis shining black. Brazil. A very variable species of which there are now many named varieties, such as *Collisii*, *dissectum*, *elegans*, *grandiceps*, *strictum*, *gracillimum*, *Legrandi*, *Pacottii*, &c. It is one of the most useful and universally grown of all Ferns, and suitable either for a hot or moderately cool house.

A. curvatum.—Fronds tripinnate, 1 to 2 feet in length; pinnules curved, oblong, obtuse, rich-green; stipes and rachis slightly downy. Brazil, &c.

A. diaphanum (*affine*).—Fronds glabrous, 10 to 15 inches long, with obtusely-oblong pinnules; stipes and rachis black, sparingly furnished with reddish hairs. New Zealand. G.

A. digitatum (*palmatum*, *speciosum*).—Fronds 1 to 3 feet long; the stalks stiff and brittle, the pinnae distant and spreading, an inch wide, deeply cut, gray-green. Peru.

A. Edgeworthii.—Fronds linear, slender, proliferous pinnate; pinnae sessile, cuneiform, toothed, $\frac{1}{4}$ inch long and wide. A good basket Fern. India.

A. farleyense (*tenerum*, var.) (fig. 716).—Fronds quadripinnate, 1 to 3 feet long, very broad and massive, drooping; pinnae large, brilliant-green, deeply fringed, the margin developed as if cristate; the noblest of its genus. Barbados.

A. Feei.—Fronds tripinnate, scandent, dull-green; rachis and stipes clothed with ferruginous hairs. Mexico.

A. Fergusoni.—A robust tropical form of *A. Capillus-Veneris*. Ceylon.

A. formosum.—Fronds quadripinnate, 1 to 3 feet long; pinnules small, rhomboid, serrate; stipes and rachis black, slightly pubescent; creeping. Australia. G.

A. glaucophyllum.—Fronds deltoid, 1 to 2 feet long, pinnules small, cuneate, green above, glaucous below; sori large and conspicuous. Mexico. G.

A. hispidulum.—A useful species, with flabellate fronds, 12 to 18 inches long; pinnules oblong-obtuse, crenate, deep-green; stipes hairy, tufted. *A. Birkenheadi* is a form of this, with fronds 2 feet long and a foot wide. A garden seedling. New Zealand. G.

A. intermedium.—Fronds bipinnate, 1 to 2 feet long; pinnules somewhat oblong, cuneate at the base, slightly serrate on the edge; rachis clothed with ferruginous hairs. Tropical America.

A. lunulatum.—Fronds deciduous, proliferous at the apex, pinnate, 6 to 12 inches long; pinnae petiolate, lunate, bright-green. East Indies.

A. macrophyllum.—Fronds pinnate, 10 to 20 inches long, erect; pinnae large, bright-red in the young state,

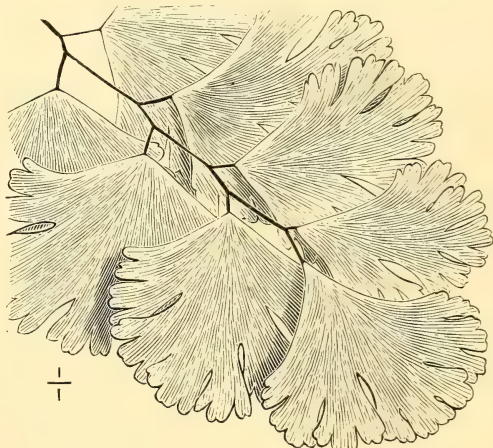


Fig. 716.—*Adiantum farleyense*.

changing to deep-green with age. Var. *albostriatum* has the pinnae streaked with white. West Indies.

A. monochlamys.—Fronds tripinnate, 9 inches long;

stipes black-brown; pinnules pea-green, silvery beneath, with a single sorus on each. Japan. G.

A. Moorei (*amabile*).—Fronds slender, drooping, 12 to 18 inches long, pale-green; pinnæ lobed. An excellent basket Fern. Peru.

A. neoguineense.—Fronds deltoid, 3-4 times pinnate, dark olive-green, with a glaucous tinge; pinnæ ovate; pinnules on hair-like stalks, $\frac{1}{2}$ inch long, crenate; sori orbicular, in deep sinuses. Affined to *A. tenerum*. New Caledonia.

A. Peruvianum.—Fronds tripinnate, 1 to 3 feet long; pinnæ trapezoid, 2 to 3 inches long, deep-green; a noble Fern. Peru.

A. polyphyllum.—Fronds decompound, 1 to 3 feet high; pinnæ 6 to 8 inches long, pinnules dimidiate, fertile on the superior edge; bright-green. Tropical America.

A. pulverulentum.—Fronds bipinnate, ovate, 1 to 2 feet long; pinnules membranous, shining-green; stipes and rachis hairy. Tropical America.

A. reniforme.—Fronds simple, reniform, 6 inches long, shining-green; stipes black, produced from a creeping caudex. Madeira, &c. Var. *asarifolium* is a Mauritius form with larger thicker fronds. G.

A. rhodophyllum.—A dwarf-tufted plant of garden origin, the pinnæ large, reddish when young, rich-green when mature.

A. tenerum.—Fronds tripinnate, 1 to 2 feet or more long; pinnules obtuse, toothed on the edges, smooth, brilliant-green. There are several varieties, including *alcicorne*, *Lathomi*, *scutum*, and *Victoria*; var. *Bessonia* has crowded imbricated reniform pinnæ. Tropical America, &c.

A. tetraphyllum.—A robust grower; fronds 1 to 2 feet long, a foot wide; pinnæ nearly an inch long, toothed. *A. Hendersoni*, *gracile*, and *obtusum* are forms of it. Tropical America.

A. trapeziforme (*Catherinae*).—Fronds quadripinnate, 1 to 3 feet long, broad; pinnules large, trapezoid, serrate, intense green; a very handsome species. Var. *cultratum* has tripinnate fronds 1 to 2 feet long; indusium reniform, bright-scarlet. West Indies.

A. Veitchianum (*monochlamys*).—Fronds 1 to 2 feet long, sturdy; pinnæ half an inch long, lobed, rounded at base, pea-green above, silvery beneath, reddish when young. An elegant Fern. Japan. G.

A. villosum.—Fronds bipinnate, 12 to 18 inches long; pinnules somewhat oblong, trapezoid; sori forming a continuous marginal line; colour shining-green. West Indies.

A. Wageri (*decorum*).—Fronds a foot long, evergreen, rose-tinted when young, tufted, 4-pinnate; stipes black-purple; pinnæ distant; pinnules crowded, $\frac{1}{4}$ inch wide, roundish, distinctly lobed. Forms of it are *elegans*, *cyclosorum*, *Oweni*, and *magnificum*. Peru.

A. Williamsii.—Near *A. ethiopicum*. Fronds 2 feet long; the rachis brown-black; pinnæ bearing yellow powder when young, bright-green, semi-orbicular. Peru. G.

AGLAOMORPHA. See *Polypodium*.

ALSPHILA.—A large arborescent genus, sori naked, or surrounded with scales; veins forked, free; receptacle globose, elevated.

A. armata.—Fronds tripinnate, 3 to 6 feet long, segments deeply divided, light-green; stipes and rachis spiny, sparingly furnished with white chaffy scales; stem slender. Tropical America.

A. aspera.—Fronds bipinnate, 8 feet long; pinnæ linear-lanceolate, pinnatifid; segments linear-oblong, serrate, light-green; stipes and rachis spiny. West Indies, &c.

A. australis.—Stem 10 to 30 feet high, bearing ovate-lanceolate bipinnate fronds, 6 to 12 feet long, dark-green above, glaucous below; stipes purple-brown, spinous, and clothed with large brown chaffy scales. Tasmania and Australia. G.

A. blechnoides.—Fronds pinnate, glabrous, 4 to 6 feet long, of a dark shining-green; pinnæ large, nearly entire, stipes reddish-brown. Tropical America.

A. excelsa.—Stem slender, 10 to 30 feet high; fronds bipinnate, 6 to 15 feet long; pale-green; stipes clothed with pale chaffy scales. Norfolk Island. G.

A. Leichardtiana.—The Whip-stick Fern of Australia. Stem slender, 10 to 20 feet high; fronds bipinnate, 6 to 9 feet long; bright-green, the pinnules spinulose-serrate, rachis dark-purple. New South Wales. G.

A. procera.—Fronds bipinnate, divisions 1 foot or more long; pinnules 3 inches long, stipes spiny and clothed at the base with dark-brown glossy scales. A handsome stove Fern. Tropical America.

A. pruinata.—Fronds tripinnate, 2 to 5 feet long; segments dentate, entire, light-green above, glaucous below; stipes and rachis purple, hairy. Tropical America.

A. Tenitis.—Fronds bipinnate, smooth, 3 to 6 feet long; pinnules lanceolate, coriaceous, 1 inch long, rich green; stipes densely clothed with large, dark-brown, chaffy scales. Brazil.

ANEMIA (*Anemidictyon*).—Sterile branches pinnate or bi-tri-pinnate, the two basal lateral branches being erect and wholly soriferous; veins forked, free.

A. collina.—Sterile frond pinnate, 6 to 12 inches long; pinnæ entire, hairy, deep-green; stipes and rachis hairy. Brazil.

A. Dregeana.—Sterile frond pinnate, 6 to 12 inches long; pinnæ dark-green; rachis tomentose. South Africa.

A. mandiocana.—Sterile frond pinnate, 10 to 15 inches long; pinnæ entire, eared at the base, 1 inch long; dark-green; rachis hairy. Brazil.

A. Phyllitidis.—Fronds 12 to 30 inches long, sterile pinnate, fertile erect, densely soriferous. There are several varieties, including *tessellata*, which has prettily veined pinnules. West Indies, &c.

A. rotundifolia.—Fronds long, narrow, drooping, formed of subrotund dark-green pinnæ, an inch wide, tinted purple when young; apices proliferous.

ASPIDIUM.—A large genus, distinguished by rotundate sori, peltate indusia, and pinnate veins. Most of the cultivated sorts are temperate. Some of the Nephrodiums are included in this genus by some authorities.

A. (Lustrea) aristata variegata.—Fronds tripinnate, shining-green, with ivory-white variegation along the midrib and pinnæ. Assam. G.

A. obliquatum (*Germinyi*).—A handsome Fern with gracefully arching bipinnate crested fronds; stipes black. New Caledonia.

A. trifoliatum.—Fronds pinnate, 1 to 2 feet long, usually one pair and a terminal pinnæ; lower pinnæ lobed, margins crenate; dark-green. Tropical America.

ASPLENIUM.—A large genus containing many truly ornamental species; they are characterized by forked or pinnate free veins, and oblong or linear oblique sori and indusium.

A. alatum.—Fronds pinnate, rachis winged, proliferous at the apex, 10 to 15 inches long, bright-green. Tropical America.

A. (Diplazium) alternifolium.—Fronds pinnate, 12 to 18 inches long; pinnæ ovate, 3 to 5 inches long, dark-green above, paler below. Java.

A. Baptistii.—Fronds bipinnate, broadly ovate, $1\frac{1}{2}$ foot

long, smooth; pinnae 5 inches long, with about four toothed pinnules. Var. *Dreuryi* has broad, crested pinnae. Polynesia.

A. Belangeri (*Veitchianum*).—Fronds bipinnate, broadly linear in outline, 12 to 18 inches long; pinnules linear obtuse, deep-green; rachis bulbiferous. Java.

A. bulbiferum.—Fronds tripinnate, pendulous, very proliferous, 1 to 2 feet long; stipes green and brown. There are many varieties. Var. *Fabianum* has fronds 2 to 3 feet long, dark-green, viviparous; pinnules finely divided. New Zealand. G.

A. caudatum.—Fronds pinnate, 1 to 3 feet long, 6

inches broad; pinnae long, deeply lobed, dentate and sharply tapering towards the apex. East Indies.

A. cicutarium.—Fronds subtripinnate, lanceolate, 10 to 18 inches long, light-green; finely divided. An elegant little Fern. Jamaica, &c.

A. compressum.—Fronds pinnate, viviparous, 1 to 2 feet long, shining-green, the pinnae oblong, tapering, serrate; rachis winged; caudex erect, scaly. St. Helena. G.

A. dimorphum.—Fronds 12 to 18 inches long; fertile tripinnate, segments linear; sterile bipinnate, with roundish pinnules, bright-green. Norfolk Island. G.

A. erectum.—Fronds pinnate, 6 to 12 inches long; .



Fig. 717.—*Asplenium Nidus australasicum*.

pinnae oblong, deeply incised, the lower ones triangular, bright-green; stipes black, channelled above. Bourbon.

A. falcatum.—Fronds pinnate, lanceolate, smooth, 1 to 2 feet long, pendulous; pinnae trapezoid, with tail-like points, cuneate at the base, bright-green. Tropics. G.

A. flabellifolium.—A good basket Fern, with slender, pendulous, pinnate fronds, proliferous, 10 to 15 inches long; pinnae fan-shaped. Australia. G.

A. flaccidum.—Fronds pinnate, pendulous, viviparous, 1 to 3 feet long; pinnules linear-acute; stipes green and brown; caudex scaly. New Zealand and Australia. G.

A. formosum.—Fronds pinnate, 10 to 18 inches long, bright-green; pinnae opposite, deeply incised on the superior edge. Tropical America.

A. furcatum.—Fronds bipinnate, 1 to 3 feet long, pendulous; pinnae elongate, light-green; stipes clothed with brown chaffy scales. There are numerous varieties, the most notable being *canariense*. Madeira, &c. G.

A. (Diplazium) grandifolium.—Fronds pinnate at the lower part, pinnatifid above, 1 to 2 feet long; pinnae entire, 3 inches long, dark-green. Tropical America.

A. Hemionitis (palmatum).—Very distinct, the fronds palmate, the middle lobe the longest, bright-green, 6 to 10 inches high, and growing from a creeping caudex. North Africa, Madeira, &c. G.

A. heterocarpum.—Fronds pinnate, 10 to 18 inches long, dark-green; pinnae oblong-obtuse, dentate; stipes ebeneous. East Indies.

A. laserpitiiifolium.—Fronds tripinnate, 1 to 3 feet long; pinnules cuneate, bright-green; stipes and rachis black; caudex erect, scaly. East Indies, &c.

A. longissimum.—Fronds pinnate, 2 to 5 feet long, proliferous; pinnae horizontal, 3 inches long, auricled; stipes blackish. A very excellent basket Fern. Java.

A. lunulatum (erectum).—Fronds pinnate, pendulous, proliferous, 6 to 18 inches long; pinnae oblong, subauri-

culate, 1 inch long, $\frac{1}{2}$ inch wide, the rachis winged. Tropics. There are many varieties, including *tenellum*, with wide-spreading fronds, and *lobatum*, with pinnatifid fronds.

A. marginatum.—A giant; the fronds pinnate, 8 feet long and 3 feet wide; pinnæ strap-shaped, emerald-green, Tropical America.

A. Mayi.—A pretty Fern, with dark-green shining pinnate fronds and dentate pinnæ of hard texture.

A. monanthemum.—Fronds pinnate, erect, bright-green, 6 to 12 inches long; pinnæ oblong, sori large; stipes and rachis brown. Temperate regions. G.

A. myriophyllum.—Fronds tripinnate, proliferous at the apex, dark-green; pinnules small, very elegant. West Indies.

A. Nidus, Birds'-nest Fern (fig. 717).—Fronds simple, 2 to 6 feet long, 3 to 6 inches broad, nearly the same breadth from base to apex, light-green. Var. *australasicum* has the rachis black, sharply keeled below. Var. *multilobatum* is an Australian form in which the upper part of the frond is markedly crested or pinnatifid. Tropics.

A. obtusatum.—Stout-growing, fronds pinnate, 8 to 10 inches high; pinnæ oblong, obtuse, serrate, leathery, deep-green, with a winged rachis. Var. *lucidum* has pendulous fronds 2 to 3 feet long. New Zealand and Tasmania. G.

A. rhizophorum.—Fronds bipinnatifid below, pinnate above, proliferous at apex, 12 to 18 inches long, light-green; stipes and rachis black. Jamaica.

A. scandens.—A climbing species with sessile, lanceolate, decompound fronds, 1 foot long, pale-green; elegant. Sumatra.

A. Serra.—Fronds pinnate, lanceolate, 1 to 2 feet long; pinnæ pendulous, serrate, dark-green; stipes and rachis scaly. Brazil.

A. (Diplazium) Shepherdii (striatum).—Fronds bipinnatifid, 2 to 5 feet long, bright-green; segments obtuse and dentate; caudex erect. Tropical America.

A. (Diplazium) sylvaticum.—Fronds pinnate, glabrous, 1 to 3 feet long, deep-green; pinnæ narrow, cordate at the base, crenate. Tropics.

A. viviparum (fig. 718).—Fronds tripinnate, viviparous on the upper surface, 6 to 12 inches long; segments small, linear, dark-green. Mauritius.

A. (Diplazium) zeylanicum.—Fronds pinnate below, pinnatifid above, 6 to 12 inches long, light-green; stipes and rachis profusely hirsute or scaly. Ceylon.

BALANTIUM. See *Dicksonia*.

BLECHNUM.—Handsome robust low Tree-Ferns, having simple or forked veins and free clavate venules. Distinguished from *Lomaria* by having the sori and indusia intramarginal.

B. brasiliense.—Fronds bold, pinnate, 2 to 4 feet in length; pinnæ decurrent, linear-lanceolate, 6 to 8 inches long, deep-green; stipes furnished with black chaffy hairs; caudex stout, erect. Brazil.

B. lanceola.—Fronds simple, entire, lanceolate, 3 to 6 inches long, deep-green; stipes scaly at the base; rhizome creeping. Brazil.

B. longifolium.—Fronds pinnate, 6 to 8 inches long, usually consisting of a single pair of pinnæ and a terminal one, which are large and bright-green; stipes pale-red, scaly at base; rhizome creeping. Var. *gracile* has pinnate fronds 12 to 18 inches long. Brazil.

B. occidentale.—Fronds pinnate, 12 to 18 inches long; pinnæ sessile, tapering, bright-green; stipes scaly, rhizome creeping. A free, useful plant. Tropical America, &c.

B. orientale.—Fronds bold, pinnate, broadly lanceolate, 1 to 3 feet long; pinnæ sessile, entire, linear, tapering towards the apex, pale-green; caudex erect. Tropics.

CERATOPTERIS thalictroides.—An aquatic annual species. Sterile fronds bipinnatifid, 12 to 18 inches long, proliferous; fertile fronds decompound and erect, with linear-revolute segments. Tropics.

CHEILANTHES.—This genus includes some most beautiful Ferns. They have small orbicular marginal sori on punctiform receptacles at the apex of the veins, covered by revolute indusia; veins free; caudex cæspitose or decumbent.

C. alabamensis.—Fronds bipinnate, firm in texture, 3 to 6 inches long; pinnæ deep-green; stipes black. America and Canada. G.

C. argentea.—Fronds tripartite, triangular, glabrous, 2 to 6 inches long; deep-green above, powdered below; sori black; stipes brown. Siberia and Japan. G.

C. Borsigiana.—Fronds tripartite, the lower segments bipinnatifid, 2 to 6 inches long, deep-green, golden powdery beneath; sori black. Peru.

C. californica.—Fronds densely tufted, 4 times divided, 6 to 8 inches long. California. G.

C. capensis.—Fronds bipinnate, 3 to 6 inches long; pinnules ovate, crenate, dark-green. South Africa. G.

C. chlorophylla (spectabilis).—Fronds tripinnate, 2 to 4 feet long, straggling; pinnæ alternate; segments blunt, crenate, dark-green; stipes brown, shining. Brazil.



Fig. 718.—*Asplenium viviparum*.

C. cuneata.—Fronds decompound, broadly ovate, 6 to 10 inches long, dull-green; stipes black. Mexico.

C. farinosa.—Fronds bipinnatifid, triangular, 1 to 2 feet long; segments obtuse, dark-green, white powdery beneath. East Indies, &c.

C. fragrans.—Fronds bipinnate, 4 to 8 inches long; pinnæ obtuse, light-green, fragrant; stipes and rachis hairy. South Europe, &c. G.

C. hirta.—Fronds tripinnate, hairy, 6 to 18 inches long;

pinnules pinnatifid, pale-green. The variety *Ellisiana* is larger. South Africa, &c. G.

C. myriophylla (*elegans*).—Fronds tripinnate, 10 to 20 inches long; pinnules small, pouch-shaped, smooth above, hairy below, dull-green. Tropical America.

C. radiata (*Adiantopsis*).—Fronds radiate from the top of the 6 to 12 inch black stipes, the divisions pinnate; segments oblong, auriculate, dark-green. Peru.

C. tenuifolia.—Fronds tripinnate, ovate, erect, 10 to 20 inches long; pinnules oblong, light-green; stipes and rachis brown. Tropics.

C. viscosa.—Fronds tripinnate, 6 to 18 inches long; pinnules toothed, pale-green, hairy; stipes brown, hirsute. Tropical America.

CYATHEA.—Noble arborescent Ferns, distinguished by their forked free veins and globose sori, which are covered by entire cup-shaped involucre, entirely surrounding the sorus in a young state.

C. arborea.—Fronds bi- or tri-pinnate, 6 to 12 feet long; finely divided, pale-green; stipes and rachis clothed with white chaffy scales. West Indies, &c.

C. Burkei.—Stem thick, 6 to 12 feet high; fronds bi- or tri-pinnate, elegant, 3 to 6 feet long, deep-green; stipes and rachis scaly. South Africa. G.

C. Cunninghamii.—Stem erect, slender, 6 to 20 feet high; fronds tripinnate, 6 to 9 feet long; the segments obtuse, dark-green above, slightly villous below; stipes and rachis brown, scaly. New Zealand. G.

C. dealbata.—Stem stout, 10 to 20 feet high; fronds bi-tripinnate, 6 to 7 feet long; deep-green above, silvery-white below; stipes scaly. New Zealand. G.

C. Dregei.—Stem stout, 6 to 12 feet high; fronds tripinnate, 3 to 6 feet long; pinnules finely divided, bright-green; stipes scaly. South Africa. G.

C. insignis (*princeps*).—Fronds tripinnate, 3 to 12 feet long; pinnae broad and finely divided, pale-green; stipes and rachis scaly; caudex stout. Mexico and Cuba.

C. Mastersiana.—Remarkable for its thin stem, which is 2 to 3 feet high, and graceful bipinnate fronds 3 to 4 feet long, the rachis spinous. Brazil.

C. medullaris.—Stem stout, 10 to 30 feet high; fronds tripinnate, glabrous, 10 to 15 feet long, bright-green; stipes and rachis black, muricate, profusely clothed with large chaffy brown scales. New Zealand, &c. G.

C. pubescens.—Fronds large, tripinnate; pinnules 6 to 9 inches long, with falcate toothed segments; stipes dark-brown. Jamaica.

C. serra.—Fronds decompose, 6 to 12 feet long; pinnae finely divided, pale-green; stipes spiny, clothed with very large fawn-coloured scales. West Indies.

DAVALIA (*Acrophorus*).—Hare's-foot Ferns, the scaly rhizomes of many of the species bearing some resemblance to a hare's foot. They have creeping rhizomes, and mostly decompose evergreen coriaceous fronds, free veins, marginal sori, and cup-shaped indusia.

D. aculeata.—Fronds scandent, tripinnate; pinnules cuneate and much divided, bright-green; rachis flexuose, armed with numerous recurved spines. West Indies.

D. affinis.—Fronds tripinnatifid, 9 to 18 inches long, finely divided, deep-green; rhizome scaly. Tropical Asia.

D. (Humata) alpina.—Fronds bipinnatifid, triangular in outline, 2 to 3 inches long, dark-green. Borneo.

D. bullata.—Fronds compact, deciduous, tripinnate, bright-green; rhizome slender, densely clothed with reddish-brown scales. Var. *decora* has larger fronds, and var. *Mariesi* (Japan) smaller. The last-named is grown in fantastic baskets by the Japanese. Trop. Asia.

D. canariense.—Rhizome stout, densely scaly; fronds

tripinnate, triangular, leathery, bright-green, 12 to 18 inches long; stipes and rachis brown. Madeira. G.

D. chcerophylla.—Fronds tripinnate, 12 to 24 inches long; segments pinnatifid, green, reddish when young; rhizome stout, scaly. East Indies.

D. cristata.—Fronds bipinnate, broadly lanceolate, 1 to 3 feet long, the pinnae 6 to 8 inches long, lanceolate, tapering; pinnules pinnatifid, obtuse; stipes and rachis hairy. Northern India. G.

D. dissecta.—Fronds evergreen, three to four times divided; pinnules deeply cleft and deep-green; rhizome slender, clothed with pale-brown chaffy scales. Java, &c.

D. divaricata.—Fronds quadripinnate, triangular, 2 to 5 feet long; segments small, pinnatifid, red when young;



Fig. 719.—*Davallia filiensis*.

stipes and rachis red; rhizome stout, covered with reddish-brown chaffy scales. Java.

D. elegans.—Fronds four times divided; bright shining-green, 12 to 24 inches long; pinnules tapering; rhizome stout, clothed with woolly scales. There are several named varieties; *polydactyla* has crested fronds. Malay Archipelago.

D. ferruginea.—A large sarmentose species, with decomposed fronds, having small sessile crowded cuneate segments; rhizome clothed with reddish hairs. Madagascar.

D. fijiensis (fig. 719).—A grand Fern, with stout creeping rhizomes, bearing large, graceful, finely-divided fronds, 12 to 18 inches long and 12 inches wide. There are several named varieties, the best being *plumosa*, which has fronds nearly a yard long. Fiji.

D. feniculacea.—Similar to *D. fijiensis*, but with

smaller fronds and of more herbaceous texture. A distinct elegant Fern. Fiji.

D. Griffithiana.—Rhizome clothed with silvery scales; fronds tripinnate, 9 inches long, bluish-green; pinnules with short obtuse lobes. Himalaya.

D. (Humata) heterophylla.—Fronds dissimilar; sterile entire, 3 to 6 inches long, 1 inch wide; fertile much narrower; rhizome clothed with brown scales. Malay Archipelago.

D. (Acrophorus) hispida.—Fronds evergreen, tripinnate,



Fig. 720.—*Dicksonia squarrosa*.

6 to 10 inches long; rhizomes creeping, clothed with reddish hairs.

D. immersa.—Fronds deciduous, bi-tri-pinnate, 1 to 2 feet long, yellowish-green; pinnæ long, acuminate. Tropical Asia.

D. marginalis (scabra).—Fronds deep-green, pinnate, broadly lanceolate, 1 to 2 feet long; pinnæ auriculate and dentate. Japan. G.

D. pallida (Mooreana).—Rhizomes thin, hairy, brown; fronds 1 to 2 feet long, correspondingly broad, tripinnate; the pinnules lobed or crenate, pale-green; stipes naked, shining. One of the most elegant of Ferns. Borneo.

D. parvula.—A tiny plant. Fronds flabellate, 2 to 3 inches long; segments finely divided, deep-green; rhizome slender, clothed with ferruginous scales. Singapore.

D. (Humata) pedata.—Very like *D. alpina*. Fronds bipinnatifid, 3 to 6 inches long, dark-green; margins of fertile segments crenate; rhizome slender. Malay Archipelago.

D. pentaphylla.—Fronds with two pairs of pinnæ and

a terminal one, 4 to 5 inches long, shining-green; fertile fronds contracted; rhizome slender, clothed with narrow dark-brown scales. Malay Archipelago.

D. platyphylla.—Fronds 2 to 4 feet long, tripinnate; pinnules broad, deeply divided, bright-green; stipes and rachis hirsute. The caudex stout, clothed with silky-white scales. Northern India. G.

D. retusa.—See *Lindsaya retusa*.

D. solida.—A large stately plant. Fronds three to four times divided, triangular, 12 to 30 inches long; pinnules coriaceous, oblong-acute, deeply cleft and dark-green; rhizome stout, scaly. Malay Archipelago.

D. strigosa.—Fronds bipinnate, 1 to 3 feet long; pinnæ 3 to 6 inches long, bright-green; crenate. Japan. G.

D. tenuifolia.—Fronds erect, bi- or tri-pinnatifid, ovate-lanceolate, 1 to 2 feet high, bright-green; segments narrowly cuneate and truncate. Var. *Veitchii* has fronds up to 3 feet long, elegantly arched and lace-like, with reddish stipes. East Indies.

D. Tyermanni.—Rhizomes short, branching freely,

clothed with blackish scales; fronds 6 to 9 inches long, rigid, tripinnate, like those of *D. bullata* but thicker in texture. China. G.

DEPARIA Moorei.—A handsome and distinct Fern; sori globose, marginal, or on the upper surface of the frond, which is bi- or tri-pinnatifid, triangular, 6 to 18 inches high; pinnate below, the upper portion pinnatifid. New Caledonia.

DICKSONIA.—Evergreen Tree-Ferns well deserving attention. They are characterized by large decompound, coriaceous fronds, forked veins with free venules, and a coriaceous two-valved indusium.

D. antarctica.—Stem stout, 10 to 20 feet high; fronds tripinnate, rigid, spreading, 6 to 15 feet long; pinnules deeply pinnatifid, dark-green; stipes and rachis hairy, the base scaly. Australia and Tasmania. G. Hardy in the warmer parts of Great Britain.

D. (Cibotium) Chamissoi.—Trunk tall; fronds broadly ovate, bipinnate, glossy-green; rachis scaly; pinnules linear-oblong, serrated at the apex. Sandwich Islands.

D. (Balantium) Culcita.—Caudex creeping; fronds tripinnate, 3 to 6 feet long, dark shining-green; the stipes clothed with silky hairs. Madeira, Azores, &c. G.

D. (Cibotium) glaucum.—Trunk tree-like; fronds tripinnate, ovate, green, very glaucous beneath; pinnules linear-oblong, falcate. Sandwich Islands.

D. Lathamii.—A hybrid between *D. antarctica* and *D. arborescens*, raised in the Botanic Gardens, Birmingham. It is remarkable for its sturdy habit and large glossy-green fronds.

D. (Cibotium) Menziesii.—Fronds large, bipinnate; pinnæ broadly acuminate; segments broad, obtuse, dark-green, densely clothed with woolly hairs. Sandwich Islands.

D. (Cibotium) regalis.—Fronds decompound, 6 to 12 feet long; segments lobed, bright-green; crown densely clothed with cinnamon hairs. Mexico.

D. (Cibotium) Schiedeii.—Fronds bipinnate, pendulous, 6 to 15 feet long; pinnules deeply lobed, pale-green above, white beneath; crown clothed with red hairs. Mexico.

D. squarrosa (fig. 720).—Stem slender, 6 to 20 feet high; fronds tripinnate, 10 to 12 feet long; pinnules subsessile, serrate, rigid, deep-green; stipes and rachis clothed with blackish hairs. New Zealand. G.

DIDYMOCHLENA lunulata.—The only species. Fronds 1 to 6 feet long; bipinnate, coriaceous, deep-green; the pinnules articulated with the rachis, which is densely clothed with large brown scales. Pot in rough peat and sand, and supply liberally with water; if allowed to get dry the jointed pinnules drop off. Tropical America, &c.

DOODIA.—Dwarf-growing evergreen Ferns, related to *Woodwardia*, the chief distinction being in the superficial sori.

D. aspera.—Fronds pinnatifid, 6 to 12 inches long; pinnæ slightly falcate, dull-green; stipes and rachis rough; var. *corymbifera* has shorter crested fronds. Australia. G.

D. blechnoides.—Fronds pinnatifid, rigid, broadly lanceolate, 6 to 18 inches long, dull-green; segments lanceolate, serrate; stipes clothed with black scales. Australia. G.

D. caudata.—Sterile fronds pinnate, linear-oblong, smooth, 6 to 8 inches long; fertile fronds contracted, pinnate, with linear pinnæ; apical pinnæ caudate, dark-green; rachis smooth; var. *confuens* has pinnatifid sterile fronds. Australia. G.

D. media.—Fronds pinnate, 12 to 18 inches long; pinnæ obtuse, spiny-toothed, red when young; stipes and rachis pink, downy. New Zealand, &c. G.

DORYOPTERIS. See *Pteris*.

VOL. I.

DRYARIA. See *Polypodium*.

ELAPHOGLOSSUM. See *Acrostichum*.

GLEICHENIA.—This genus contains many truly beautiful plants, characterized by their dichotomously-branched fronds, with wire-like stalks, linear pinnæ, and small, often revolute, segments. Pot in sandy peat and charcoal in well-drained pots or pans, as they enjoy an abundant supply of water, and also require ample space for the rhizomes to creep over. They thrive best in a light greenhouse, but they dislike draught.

G. circinata (fig. 721).—Fronds dichotomously divided; segments subrotund, not pouched below, green above,



Fig. 721.—*Gleichenia circinata*.

paler beneath; stipes and rachis hairy. New South Wales, &c. Var. *glaucæ* is stronger, and the under side of the fronds is beautifully glaucous. Var. *semivestita* has orbicular, concave, deep-green segments. Var. *Speluncæ* has segments somewhat ovate, pale-green above, silvery-white below. New Zealand. G.

G. Cunninghamii.—Fronds flabellate erect, 1 to 4 feet long; segments 6 to 8 inches long, dark-green above, slightly glaucous below; stipes and young growth densely covered with large brown chaffy scales. New Zealand. G.

G. dicarpa.—Fronds 1 to 3 feet long; segments orbicular, margins recurved, pouched, deep-green; stems hairy; branches smooth. Var. *longipinnata* has long narrow pinnæ. Tasmania. G.

G. dichotoma.—Fronds zigzag, repeatedly forked, variable in size, glaucous-green above, tomentose beneath, the pinnæ varying in length from 12 to 18 inches. Tropics. G.

G. flabellata.—Fronds flabellate, erect, 2 to 5 feet long; segments lanceolate, pinnatifid, the margins serrate, bright green; stipes stout, smooth. Australia. G.

G. rupestris.—Fronds 2 to 6 feet long; pinnæ broad,

deep-green, glaucous beneath, the margins recurved, pouched; stipes dark-brown; *gigantea* and *glaucescens* are varieties. Australia. G.

GONIOPHLEBIUM. See *Polypodium*.

GONIOPTERIS. See *Polypodium*.

GYMNOGRAMME.—This genus contains many extremely handsome plants, distinguished by their free forked veins and linear naked sori. The most beautiful have the under side of the fronds densely covered with a farinose powder of a white or golden colour, which has given rise to the popular names of Gold and Silver Ferns. The genus contains two annual species—*G. leptophylla* and *G. cheroophylla*, the first having almost a world-wide distribution; the latter is West Indian. Plant in peat, loam, and sand, providing ample drainage. They grow best in a sunny position in the warm house, and whilst they like a moist atmosphere, they must not be syringed. In winter they should be watered sparingly.

G. calomelanos.—Fronds bipinnate, 10 to 30 inches long, deep-green, densely powdered beneath. Tropical America. There are numerous varieties, the best known being *Alstoni*, *chrysophylla*, *Laucheana*, *grandiceps*, *Peruviana*, and *Parsonsi*.

G. decomposita (*elegantissima*).—Fronds 1 to 2 feet long, the rachis flexuose and brown, the pinnules divided into numerous narrow segments, bright-green, yellow powdery beneath. Very elegant, and of rapid growth. Andes.

G. flexuosa.—Fronds scandent, zigzag, divided into slender segments, bright-green on both sides, entirely destitute of powder. Tropical America.

G. Lathamii.—A garden hybrid raised in the Botanic Gardens, Birmingham, from *decomposita* and *schizophylla*, and possessed of the characters of both.

G. Pearcei.—Fronds 2 feet long, divided into narrow linear segments, bright-green above, slightly powdered below; stipes brown; var. *robusta* has larger fronds with powdery stipes. Peru.

G. pulchella.—Fronds finely divided, 10 to 20 inches long, wide at the base, bright-green, white-powdered below. Stipes black. Venezuela. Var. *Mayi* has shorter crested fronds; var. *Wattenhalliana* is another crested form with yellow powder.

G. schizophylla (fig. 722).—Fronds crowded, slender, 18 to 24 inches long, 4 inches wide, gracefully arching, tripinnatifid, forked and proliferous at the apex. One of the most graceful; excellent for baskets. Var. *gloriosa* has longer fronds. Jamaica.

G. sulphurea.—Fronds 6 to 10 inches long, bipinnate, spreading; pinnules slightly lobed, bright-green, yellow-powdered beneath. West Indies. Var. *grandiceps* is a crested form.

G. tartarea.—Fronds bipinnate, spreading, 1 to 2 feet long; pinnules obtusely lobed, green, white-powdered below. Stipes black. Tropical America.

G. trifoliata.—Fronds bipinnate, 2 to 4 feet high; pinnæ trifoliate, the segments linear, green, clothed below with white (sometimes yellow) powder. Tropical America.

G. Veitchii.—An elegant Fern, said to be an accidental hybrid between *decomposita* and *Pearcei robusta*.

HEMIONITIS *cordata* has simple, entire, cordate, deep-green fronds, proliferous when barren, the stipes black, and the rhizome creeping; *H. palmata* has palmate fronds, with oblong crenulate segments, hairy on both sides, the sterile fronds proliferous, spreading, the fertile ones erect.

HEMITELIA.—Noble aborescent Ferns, distinguished from *Cyathea* by their half cup-shaped involucre, and by the basal venules becoming curved; also by their large, broad, coriaceous fronds.

H. capensis.—Stem 10 to 15 feet high; fronds tripinnate, 3 to 4 feet long, dark-green, falcate and serrated, the basal pinnules resembling a *Trichomanes*; stipes scaly. South Africa. G.

H. grandifolia.—Fronds pinnate, 6 to 8 feet long; pinnæ 10 to 12 inches long; segments obtuse, somewhat falcate, bright shining-green; stem about 6 feet high. Tropical America.

H. horrida.—Fronds bipinnate, 6 to 10 feet long; pinnæ sessile, bright-green above, paler below; stipes and rachis scaly and armed with strong spines; stem 10 to 12 feet high. West Indies.

H. Lindenii.—Stem less than an inch in diameter and about 2 feet high; fronds large, handsome. Peru.



Fig. 722.—*Gymnogramme schizophylla*.

H. (Cyathea) Smithii.—Stem stout, 6 to 10 feet high; fronds tripinnate, broadly lanceolate, spreading, 6 to 8 feet long; pinnules lanceolate; stipes and rachis clothed with brown chaffy scales. New Zealand. G.

H. speciosa.—Fronds pinnate, 6 to 10 feet long; pinnæ serrate on the edges, 10 to 15 inches long, dark-green; stipes and rachis scaly. Tropical America.

HUMATA. See *Davallia*.

HYMENOPHYLLUM.—Closely allied to *Trichomanes*, from which it is distinguished by its involucre, which for the most part consist of two valves, instead of being entire and cup-shaped.

H. aeruginosum.—Fronds tripinnatifid, ovate, pendulous, 6 to 8 inches long; pinnæ dense, the segments deep-green, slightly tomentose. New Zealand. G.

H. asplenoides.—Fronds smooth, pinnatifid, 2 to 4 inches long, pale-green. West Indies, &c.

H. bivalve.—Fronds decomposed, ovate, 6 to 8 inches long; pinnules small, serrate, green. New Zealand. G.

H. caudiculatum.—Fronds smooth, tripinnatifid, 6 to

18 inches high, the apex of frond lengthened into tail-like appendages; stipes winged. Brazil.

H. ciliatum.—Fronds sub-pinnate, 2 to 4 inches long; pinnules much divided, hairy, especially at the margins; stipes and rachis winged throughout. West Indies, Brazil, &c.

H. crispatum.—Fronds tripinnatifid, triangular, 6 to 10 inches long, wings of the stipes and rachis waved, bright-green. New Zealand. G.

H. cruentum.—Fronds simple, 3 to 6 inches long, bright-green when young, changing with age to reddish-brown; stipes terete, long and slender. Chiloe.

H. demissum.—Fronds tripinnate, ovate-acuminate, 6 to 12 inches long; segments linear, finely divided, shining, bright-green; stipes smooth, terete. New Zealand, &c. G.

H. dilatatum.—Fronds tripinnatifid, erect, 1 to 2 feet long; pinnæ ovate-lanceolate; segments entire, pale-green; stipes and rachis winged. New Zealand. G.

H. flabellatum.—Fronds bright shining-green, finely divided, fan-shaped, 6 to 12 inches long. New Zealand, Tasmania, &c. G.

H. flexuosum.—Fronds tripinnatifid, 6 to 12 inches long; segments finely divided, undulated or flexuose, dark-green. New Zealand. G.

H. hirsutum.—Fronds pinnate, 3 inches long; pinnæ linear, entire, hairy, pale-green. West Indies, &c.

H. polyanthos.—Fronds tripinnatifid, 6 to 8 inches long, 2 inches wide; segments small, entire, spreading, bright-green; stipes winged above. Tropics. G.

H. pulcherrimum.—Fronds tripinnate, 6 to 18 inches long; segments short, entire, bifid at the apex, undulate; stipes and rachis winged. New Zealand. G.

H. scabrum.—Fronds bi-tri-pinnatifid, erect, 10 to 15 inches long; segments finely divided, pale-green; stipes and rachis terete, scaly. New Zealand. G.

H. sericeum.—Fronds pinnate, linear-oblong, 10 to 24 inches long; pinnæ lacinated, covered with dense ferruginous woolly hairs. Tropical America.

HYPOLEPIS.—A small handsome genus, allied to *Cheilanthes*. The fronds are evergreen, bi- or quadri-pinnate, piloso-glandulose, with free veins and round sori. They are of easy culture.

H. Bergeana.—Frond 3- to 4-pinnatifid, 6 to 18 inches long, triangular; stipes and rachis hairy; pinnules finely lobed. South Africa. G.

H. distans.—Fronds bipinnate, 6 to 12 inches long, pinnules oblong, sharply cut, serrate; stipes slender, flexuous; rachis scabrous. New Zealand. G.

H. repens.—A handsome free-growing plant, with tripinnate fronds 2 to 4 feet long; segments linear-obtuse, pinnatifid, pale-green; stipes and rachis brown; rhizome stout. West Indies.

H. tenuifolia.—Fronds quadripinnate, stout, 2 to 4 feet long; lobes of segments linear-oblong, bright-green, hairy; rachis tomentose. New Zealand. G.

LASTREA. See *Nephrodium*.

LINDSAYA.—Adiantum-like Ferns somewhat difficult to cultivate, the only species that behaves well under ordinary treatment being *L. retusa*, which forms a big specimen with large tripinnate fronds, the lower divisions a foot long, the pinnules lanceolate-deltoid, glaucous-green. Philippines.

LITOBROCHIA. See *Pteris*.

LOMARIA.—This genus is nearly allied to *Blechnum*, but differs from it in having marginal sori. The pinnæ on the barren fronds are broader than those on the fertile fronds, which are developed in whorls.

L. attenuata.—Fronds pinnatifid, 10 to 20 inches long;

pinnæ alternate, tapering, dark-green; stipes smooth; caudex slender, erect. Mauritius.

L. australis.—Fronds pinnate, 1 to 2 feet long, the pinnæ oblong, obtuse. South Africa. G.

L. blechnoides.—Fronds 5 to 10 inches long; segments short, obtuse; fertile fronds shorter. Chili. G.

L. Boryana (magellanica).—Fronds pinnate, 1 to 2 feet long; pinnæ lanceolate, deep-green; stipes and rachis scaly; caudex stout, 1 to 4 feet high. Var. *cycadæfolia* has broader pinnæ. Tropics. G.

L. ciliata.—Fronds divided almost down to the rachis, 6 to 12 inches long; segments præmorse or bifid, with fine teeth-like hairs on the edges. New Caledonia. G.

L. discolor.—Fronds pinnate, 1 to 2 feet long; pinnæ glabrous, bright-green, gray beneath; stipes scaly; caudex stout, 1 to 3 feet high. Var. *bipinnatifida* has the pinnæ elegantly divided. New Zealand. G.

L. fluviatilis.—Fronds pinnate, 1 to 2 feet long, pinnæ nearly round, clothed with reddish chaffy scales. New Zealand. G.

L. gibba.—Fronds pinnatifid, 1 to 2 feet long, elegantly waved, deep-green. New Caledonia. G.

L. gigantea.—A Tree-Fern with a short thick trunk, bearing a crown of lanceolate-pinnate fronds 3 feet long, light-green, the stipes black; fertile fronds narrow with linear pinnæ; probably only a form of *L. attenuata*. South Africa. G.

L. lanceolata.—Fronds pinnatifid, 6 to 12 inches long, pinnæ oblong-obtuse, slightly toothed, dull-green; caudex tufted. New Zealand. G.

L. L'Herminieri.—Fronds pinnate, 6 to 10 inches long; pinnæ decurrent, apex blunt; young fronds rich-red. Tropical America.

L. Patersoni.—Fronds simple, entire, lanceolate, 8 to 10 inches long; fertile frond, linear, longer than the sterile; caudex tufted. Australia. G.

L. procera (capensis).—Fronds pinnate, 1 to 3 feet long, the pinnæ oblong-obtuse, deep-green; stipes and rachis clothed with chaffy scales. New Zealand, &c. G.

LYGODIUM (*Lygodictyon*).—Elegant climbing Ferns, with conjugate or palmate fronds. The veins are free, extending beyond the margin, and there forming compressed distichous sporangiferous spiculæ.

L. dichotomum (flexuosum).—A sturdy climber with bipartite palmate fronds, the divisions 4 to 10 inches long, $\frac{1}{2}$ inch broad, rich-green; fertile fronds much contracted. India, &c.

L. japonicum.—In the way of *L. dichotomum*, but with smaller pinnules, and less robust habit. Tropics. G.

L. palmatum (fig. 723).—Fronds wiry, climbing indefinitely; barren pinnæ palmate, 2 inches wide; fertile pinnæ divided into small linear leaflets. May be grown up a pillar in a cool house. United States. G.

L. reticulatum (Forsteri).—Fronds bipinnate, dichotomously divided, scandent; pinnæ broadest at the base, bright-green. Polynesian Islands.

L. scandens.—Stems up to 15 feet; fronds simply pinnate; rachis zigzag, terminal pinnule lobed. A useful plant for covering pillars. India, &c.

MICROLEPIA. See *Davallia*.

NEPHRODIUM (*Lastrea*).—Aspidioid Ferns, distinguished by a reniform indusium, free or anastomosing veins, and pinnate or compound fronds. They are generally easy to cultivate, having a stout usually creeping caudex and a robust root system.

N. articulatum.—Fronds pinnate, smooth, lanceolate, 1 to 4 feet long; pinnæ linear-lanceolate, deeply serrate, bright-green; stipes light-brown. Ceylon.

N. chrysolobum.—Fronds pinnate, 10 to 15 inches long; pinnæ deeply pinnatifid; sori bright-red. Brazil.

N. (Sagenia) cicutarium.—Fronds bipinnatifid, 1 to 2 feet long; pinnæ broad, margins crenate, pale-green; sori numerous, bold. Jamaica.

N. cyatheoides.—Fronds pinnate, 1 to 3 feet long; pinnæ large, deeply serrate, light-green. Tropical Asia.



Fig. 723.—*Lygodium palmatum*.

N. decompositum.—Fronds tripinnate, 1 to 2 feet long; pinnules deeply pinnatifid; stipes furnished with dark-brown chaffy scales; rachis downy. Var. *glabellum*.—Fronds 9 to 12 inches long; pale-green. Australia. G.

N. decurrens.—Fronds pinnate below, pinnatifid in the upper part, 12 to 18 inches long; pinnæ sessile, sori reddish-brown; stipes and rachis straw-colour. China. G.

N. deltoidum.—Fronds erect, pinnate, 6 to 12 inches long; pinnæ on the upper half large, smaller below; rhizome creeping. Tropical America.

N. elongatum.—Fronds bipinnate, 1 to 3 feet long; pinnules oblong, dentate; stipes pale; caudex creeping. Madeira, Azores. G.

N. hispidum.—Fronds tripinnate, triangular, 9 to 12 inches long; pinnules narrow, mucronate, dentate; stipes and rachis hairy; caudex creeping. New Zealand. G.

N. Hookeri.—Fronds pinnate, 1 to 3 feet long; lower pinnæ deltoid, the others elongate, tapering to a point; edges toothed. East Indies.

N. lepidum.—Fronds pinnate, serrate, light-green, caudex tufted. Brazil. G.

N. lucidum.—Rhizome creeping, scaly; fronds 12 to 15 inches long, 6 inches wide, with about twenty pairs of linear pinnatifid sessile pinnæ, with apical sori. Madagascar.

N. (Sagenia) macrophyllum.—Fronds pinnate, 2 to 4 feet long, terminal; pinnæ large, sessile, the lower pair auriculate, pale-green. Tropical America.

N. patens.—Fronds pinnate, 1 to 3 feet long; pinnæ sessile, lanceolate, pinnatifid; segments falcate, pubescent; stipes erect, scaly. Tropics.

N. (Sagenia) Piea.—Fronds pinnatifid, 1 to 2 feet long, 4 to 6 inches wide; pinnæ broad and entire, bright-green; sori brown; stipes shining-black. Mauritius.

N. pteroides.—Fronds pinnate, stout, 1 to 3 feet long; pinnæ an inch wide, deeply lobed, lanceolate, the segments obtuse; sori submarginal. India.

N. recedens.—Fronds deltoid, tripinnate, pubescent, 1 to 2 feet long; pinnules oblong, deeply pinnatifid, pale-green. Ceylon, &c.

N. (Sagenia) repandum.—Fronds dissimilar, sterile pinnate, coriaceous, oblong-acuminate, drooping, bright-green; fertile contracted, repand, 1 to 3 feet long. Malay Islands.

N. Rodigasianum.—Fronds handsome, spreading, lanceolate, pinnate, 3 to 4 feet long, with narrow pinnæ. Samoa.

N. truncatum.—Fronds pinnate; pinnæ lanceolate, deeply and obtusely lobed, dark-green. East Indies.

N. unitum.—Fronds pinnate, 1 to 3 feet long; pinnæ deeply pinnatifid, 4 to 6 inches long, linear-lanceolate, pubescent below. Tropics.

N. venustum.—Fronds pinnate, 1 to 3 feet long; pinnæ lanceolate, 6 inches long, serrate; stipes scaly. Jamaica, &c.

NEPHROLEPIS.—Elegant Ferns, distinguished by their forked veins and free clavate venules, the superior basal one being fertile, the receptacles terminal, and the indusium reniform or subreniform. The fronds are pinnate, and the pinnæ articulated with the rachis; rhizome erect, producing numerous slender wiry stolons, which bear fasciculate crowns. On account of their stoloniferous character they require abundant surface room; they are admirably adapted for rockeries.

N. acuta.—Fronds 2 to 3 feet long; pinnæ acuminate, truncate, with serrate margins and auriculate base, bright-green. *N. Bausei* is a fine garden form with deeply-divided pinnæ. Java.

N. cordifolia (tuberosa).—Fronds pinnate, 2 to 4 feet long; pinnæ oblong, superior base auriculate, serrate; stipes and rachis furnished with ferruginous hairs; rhizome tuberos. Var. *undulata* has fronds 1 to 2 feet long. East Indies, &c. *Pluma* is an elegant form of it from Madagascar.

N. davallioides.—Fronds 2 to 4 feet long; pinnæ lanceolate, 4 to 5 inches long, deep-green; fertile pinnæ elongated, crenate. Var. *furcans* (fig. 724) has forked or tasselled pinnæ. East Indies.

N. Duffii (fig. 725).—Fronds in a dense tuft, erect, repeatedly forked, clothed with short ovate, serrate, scale-like pinnæ. Mr. Baker thinks this is a monstrous form of *N. cordifolia*. An elegant stove plant. Australia and New Guinea.

N. exaltata.—Fronds 2 to 4 feet or more long, pale-green; pinnæ oblong-acute, the superior base auriculate; stipes slightly scaly. Tropical America.

N. rufescens.—Fronds 2 to 4 feet long, 6 to 9 inches

wide; pinnae strap-shaped $\frac{1}{2}$ -inch wide; rachis clothed with rust-coloured hairs. Var. *tripinnatifida* (fig. 712) has the pinnae cut and tasselled at the apex, and is one of the handsomest of Ferns. Solomon Islands.



Fig. 724.—*Nephrolepis davallioides furcans*.

NIPHOBOLUS. See *Polypodium*.

NOTHOCHLENA.—Neat Ferns, many of them clothed on the under side with a dense coating of farinose powder; the sori are, however, marginal. Although not difficult to cultivate, they require considerable attention in winter, when their fronds must not be wetted. Pot in fibrous peat, sand, and lumps of sandstone.

N. Eckloniana.—Fronds 6 to 12 inches long, tripinnate; green above, clothed with long white scales below, which become tawny with age. South Africa. G.

N. flavens.—Fronds tripinnate, 6 to 10 inches long; pinnules distant, roundish, bright-green, yellow-powdered below; sori marginal, black; stipes slender, black. Tropical America.

N. lanuginosa.—Fronds 6 to 10 inches, an inch wide, bipinnate; deep-green, clothed with white woolly hairs which turn to brown with age. South Europe, Madeira, &c. G.

N. Marantæ.—Fronds 4 to 10 inches long, bipinnate; pinnules oblong, obtuse, deep-green, clothed below with reddish-brown scales. South Europe, &c. G.

N. nivea.—Fronds tripinnate, 6 to 12 inches long; pin-

nules roundish, dark-green above, white farinose beneath; sori marginal, black; stipes and rachis black. Tropical America.

N. rufa.—Fronds pinnate, 10 to 20 inches long; pinnae oblong, pinnatifid, light-green, white woolly beneath. Tropical America.

N. sinuata (lævis).—Fronds 1 to 2 feet long, pinnate; pinnae broad, deeply lobed, deep-green above, white woolly beneath. Mexico.

N. sulphurea (pulveracea).—Fronds bipinnatifid, 6 to 18 inches long; pinnae deeply pinnatifid, under side dusted with white powder. Mexico.

N. trichomanoides.—Fronds 12 to 18 inches long, pinnate; pinnae oblong, crenate, deep-green, white or tawny beneath. West Indies.

PELLEA (*Platyloma*).—Fronds pinnate or bipinnate, often coriaceous and glaucous, venation free, sori marginal, the receptacles formed of a portion of the apices of the venules, the edges of the pinnae becoming in some species reflexed, and forming a spurious indusium.

P. atropurpurea.—Fronds 6 to 12 inches long, bipinnate; pinnules oblong or ovate; stipes and rachis hirsute. North America. G.

P. Calomelanos.—Fronds 6 to 12 inches long, bipinnate,

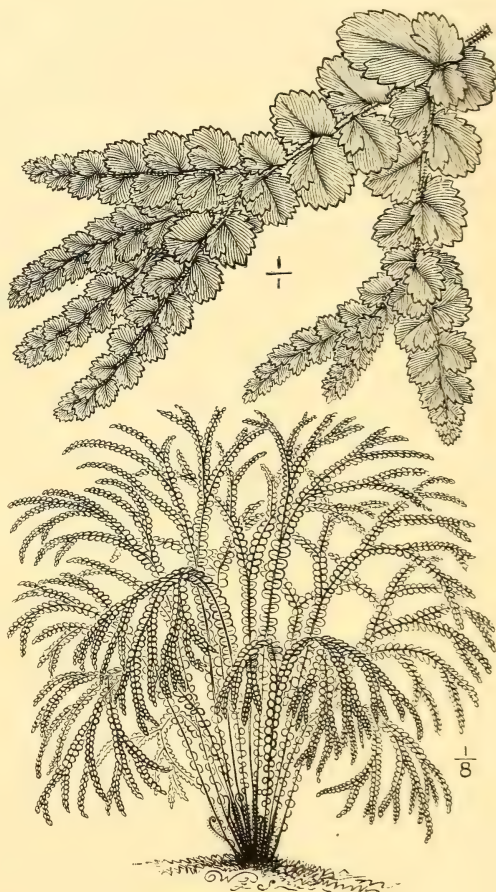


Fig. 725.—*Nephrolepis Duffii*.

glaucous; pinnules trilobate, cordate; stipes and rachis black, with chaffy scales at the base. South Africa. G.

P. cordata.—Fronds 1 to 2 feet long, bipinnate; pinnules cordate, glaucous-green; stipes and rachis pale-

brown. *Var. flexuosa*.—Fronds 3 to 6 feet long; rachis flexuose, subscentent. Mexico. G.

P. falcata.—Fronds 1 to 2 feet long, pinnate; pinnae narrow-lanceolate, falcate, dark-green; stipes and rachis scaly. Australia. G.

P. rotundifolia.—Fronds 12 to 18 inches long, pinnate, linear; pinnae subrotund, crenate, deep-green; sori forming a brown band round the pinnae; stipes and rachis clothed with reddish-brown scales. New Zealand. G.

PHLEBODIUM. See *Polypodium*.

PLATYCERIUM.—Distinct epiphytal Ferns with dimor-

phous fronds, the sterile being imbricating and sessile, whilst the fertile are forked or lobed, antler-like, the sori occupying large unequal patches on the under side of the lobes. These plants thrive in baskets of rough peat and sphagnum; they also form beautiful objects if fastened to a bracket of wood or cork and grown in the stove.

P. aethiopicum (*Stemmaria*).—Sterile fronds almost entire, 1 to 2 feet in diameter; fertile simple, two- to three-lobed, widening upwards, 1 to 2 feet long. West Africa.

P. alcinorne, Elk's-horn Fern (fig. 726).—Sterile fronds



Fig. 726.—*Platycerium alcinorne*.

imbricating, nearly round, upper edge lobed; fertile stipitate, erect, several times forked, leathery. Australia. G.

P. biforme.—The largest of all, sterile fronds imbricating, forked on the upper edge; fertile ones elongated, several times branched; segments long, strap-shaped, the fertile lobes reniform, stalked. Borneo.

P. grande.—Sterile fronds broad and imbricating, 1 to 2 feet in diameter, lobed; fertile branched, 1 to 3 feet long, the sorus occupying the upper edge of the disc. Tropical Asia.

P. Willinkii (fig. 727).—Sterile fronds erect, deeply lobed, 12 to 18 inches wide; fertile ones in threes, pendent, 2½ feet long, divided into narrow segments, bearing spores near the tips. Java.

POLYBOTRYA. See *Acrostichum*.

POLYPODIUM.—A large and polymorphic genus, now embracing *Phegopteris*, *Goniopteris*, *Dietyopteris*, *Goniophlebium*, *Niphobolus*, *Phymatodes*, *Pleopeltis*, and *Drynaria*. Characterized by round or nearly round sori without indusium. The species vary considerably in venation.

P. aureum.—Fronds pinnatifid, 2 to 6 feet long;

segments obtuse, wavy, bluish-green; sori forming a double row on each side the costa; rhizome clothed with large ferruginous scales. *Var. areolatum* has fronds 1 to 2 feet long, the sori forming a single row on each side the costa. Tropical America. *Var. sporodocarpum* has broad fronds, with deeply-pinnatifid long narrow segments. *Var. pulvinatum* has numerous golden-yellow sori.

P. (Drynaria) conjugatum (*coronans*).—A noble species; fronds pinnatifid, erect, 2 to 4 feet long, 1 to 2 feet wide, with a dilated base, pale-green. East Indies.

P. crenatum.—Fronds pinnate, 10 to 18 inches long; pinnae 4 to 6 inches long, 1 to 2 inches broad, evenly crenulate, bright-green. West Indies.

P. (Drynaria) diversifolium.—Sterile fronds sessile, cordate at the base, deeply lobed on the upper edge; fertile fronds elegantly pinnate, pendulous, 2 to 4 feet long, pale-green. Malay Archipelago, &c.

P. Lepidopteris.—Fronds pinnate, lanceolate, 12 to 18 inches long; pinnae sessile, dark-green, clothed with white ciliated hairs; sori deep-red. Tropical America.

P. lingua.—Fronds entire, lanceolate acuminate, 6 to 12 inches long; dark-green with white scales, the under side densely pubescent; sori red, covering the whole

surface of the frond. *Var. corymbiferum* has the apex of the frond branched and crested. Japan and China. G.

P. Meyenianum has the sessile sterile fronds cordate, lobed, 3 to 6 inches long; fertile fronds pinnatifid, 1 to 3 feet long; dark-green. East Indies, &c.

P. pectinatum.—Fronds pinnate, 1 to 2 feet long; pinnae sessile, linear, dull-green; sori uniserial; stipes and rachis



Fig. 727.—*Platycerium Willinkii*.

black. *Var. Paradiseae* has fronds slightly pubescent, the sori golden-yellow, and the stipes and rachis dark-brown. Tropical America.

P. Picotii.—Fronds crowded, arching wavy, elongate, entire, leathery, shining-green, glaucous beneath, 3 feet long and 6 inches wide. Brazil.

P. plesiosorum (colpodes).—Fronds pinnate in the lower part, pinnatifid above, broadly lanceolate, 1 to 2 feet long; pinnae linear-lanceolate, sessile, deep-green. Venezuela.

P. (Drynaria) quercifolium.—Sterile fronds sessile, cordate-ovate, deeply lobed, 5 to 6 inches long; fertile fronds broadly pinnatifid, rigid, 1 to 2 feet long, glaucous-green. East Indies, &c.

P. reptans.—Fronds pinnate, pendulous, proliferous at the apex, 6 to 12 inches long; pinnae deltoid or oblong-obtuse, light-green. Pretty for a basket. *Asplenoides* is an erect, larger form. Jamaica.

P. rupestre.—Fronds simple, entire, 2 inches long, ovate; fertile fronds linear, 3 to 4 inches long, white below. Australia. G.

P. Schneiderianum.—A supposed garden hybrid between *P. aureum* and *P. vulgare*, var.; fronds 2 to 3 feet long, with the pinnae elegantly waved and crested. G.

P. squamatum.—Fronds pinnate, lanceolate, 1 to 2 feet long, 6 inches broad; pinnae and stipes densely clothed with ciliate ferruginous scales. West Indies.

P. stigmaticum (venosum) (fig. 728).—A small, creeping species with slender rhizomes, entire, erect fronds 2 to 4 inches long, $\frac{1}{2}$ inch wide, dark-green, the veins very distinct; sori in two rows. Colombia. *P. lycopodioides* is very similar but has broader fronds.

P. subauriculatum.—Fronds pinnate, pendulous, 5 to 10 feet long; pinnae entire, smooth, bright-green; sori

immersed, forming raised bosses; a fine basket Fern. Malay Archipelago.

P. verrucosum.—Fronds pinnate, pendulous, 4 to 6 feet long; pinnae 6 to 8 inches long, bright-green, sori large, forming raised bosses. Malaya.

POLYSTICHUM [ASPIDIUM].—Evergreen Ferns, with free veins, dot-like sori, and peltate indusia; texture more or less coriaceous; teeth usually awned.

P. aristatum.—Fronds tri-quadri-pinnate, deltoid, 1 to 3 feet long; pinnules broadly oblong, deeply divided, cuneate, spinose; sori large; stipes and rachis hairy. *Var. variegatum* is a pretty form. Tropical Asia.

P. capense.—Fronds 2 to 6 feet long, tripinnate, broad, and spreading; pinnules large, obtuse, dentate; caudex stout, creeping, clothed with large chaffy scales. South Africa. G.

P. denticulatum.—Fronds tripinnate, triangular, 6 to 12 inches long; pinnae broad; pinnules finely divided, dentate, dull-green; stipes and crown scaly. Jamaica.

P. falcinellum.—Fronds 12 to 20 inches long, pinnate; pinnae linear-oblong, acute, eared, serrate; sori red, conspicuous; stipes densely scaly; caudex erect. Madeira. G.

P. frondosum.—Fronds 2 to 3 feet long, tripinnate; pinnae largest at the base, pinnules dentate, acuminate; stipes and rachis scaly. Madeira. G.

P. lepidocaulon.—Fronds 1 to 2 feet long, pinnate, the rachis lengthened out into tail-like points and proliferous at the apex; pinnae broad, auriculate, mucronate; stipes scaly. Japan. G.

P. proliferum.—Fronds 1 to 2 feet long, bipinnate, linear-lanceolate, viviparous at the apex; pinnules dentate; stipes furnished with large black chaffy scales. A form of *P. aculeatum*. Tasmania. G.

P. triangulum.—Fronds pinnate, $1\frac{1}{2}$ foot long; pinnae oblong, mucronate, auriculate; stipes and rachis densely scaly. The variety *laxum* has the pinnae more divided. West Indies.

P. venustum.—Fronds erect, 6 to 12 inches long, bipinnate; pinnules small, spiny-toothed; stipes and rachis



Fig. 728.—*Polypodium stigmaticum*.

clothed with black, imbricating, chaffy scales; caudex erect. New Zealand. G.

P. vestitum.—Fronds 1 to 2 feet long, bipinnate, lanceo-

late, rigid; pinnae oblong; pinnules ovate, mucronate; stipes and rachis clothed with chaffy scales. A form of *P. aculeatum*. New Zealand.

PTERIS.—A large and diversified genus, the plants mostly of vigorous habit, and characterized by forked veins which are united by the marginal receptacle upon which the sori are situated, forming a continuous band; indusium continuous.

P. arguta.—Fronds 3 to 5 feet long, bi-tri-pinnate; pinnae pinnatifid, segments obtuse, dentate, pale-green; stipes brown. South Europe. G.

P. argyræa.—Fronds pinnate, 1 to 4 feet high; pinnae deeply pinnatifid, the lowest pair again divided, silvery-white and green. East Indies.

P. collina.—Fronds palmate, 6 to 10 inches high, three to five lobed; segments obtuse in the sterile fronds, lanceolate when fertile, bright-green; stipes black. Brazil.

P. cretica.—Fronds with erect, wiry, polished stipes, pinnate, the terminal pinnule elongated, green. Var. *albolineata* has prettily variegated fronds. *P. Mayi* is a crested form of this; *crispata* has crisped and wavy pinnules. Tropics.

P. denticulata.—Similar to *P. cretica*; fronds pinnate, 1 to 2 feet long; pinnae decurrent; segments serrate. Brazil.

P. ensiformis (crenata).—Fronds 10 to 20 inches long, bipinnate, dark-green; pinnae ovate where sterile, linear where fertile, decurrent, crenate. *P. Victorie* is a beautiful form of this with variegated fronds; *crispata* is another form. China, &c. G.

P. hastata.—Fronds 10 to 18 inches long, bipinnate, pinnules hastate, sori forming a dark-brown marginal band; stipes and rachis brown. South Africa. G.

P. leptophylla.—Fronds bi-tri-pinnate, 12 to 18 inches long; segments finely divided, bright-green; sori red. Brazil.

P. longifolia.—Fronds 1 to 2 feet long, pinnate; pinnae linear, 5 to 6 inches long, serrate, dull-green; sori brown; stipes and rachis slightly scaly. Var. *Mariesi* is an elegant Japanese form; *nobilis* has fronds 5 feet long and pinnae 8 inches long and $\frac{3}{4}$ inch wide. Tropics. G.

P. macilenta.—Fronds tripinnate, broad, spreading, 1 to 3 feet long; pinnules deeply cut, serrate at the edges, light-green. New Zealand. G.

P. macroptera.—Fronds bipinnatifid, 2 feet or more long; segments broad, rich-green. Brazil.

P. nobilis.—Fronds simple, entire, sagittate when young, palmate when mature, 12 to 18 inches long, bright-green with a broad band of white up the centre of each segment. Brazil.

P. palmata.—Fronds palmate; segments narrow and distant, proliferous, 10 to 12 inches high, dark-green. Brazil, &c.

P. podophylla.—Fronds tripartite, 3 to 5 feet long, including the stout erect stipes; segments pinnatifid, bright-green. West Indies.

P. sagittifolia.—Fronds sagittate, erect, 6 to 12 inches high, bright-green; stipes black. Brazil.

P. semipinnata.—Fronds erect, pinnate, 1 to 2 feet long; pinnae divided on the lower side only, deep-green. Var. *Bausei* is an elegant garden form. Tropics.

P. serrulata.—Fronds 6 to 18 inches long, pinnate; pinnae linear, narrow, serrate, the lower pair bipartite, light-green. There are many garden varieties, the most notable of which are:—*angustata*, *Childsii*, *Cowanii*, *compacta*, *corymbifera*, *crispata*, *crispata variegata*, *densa*, *gigantea*, *Pocockii*, *gracilis*, *gloriosa*, *Leyi*, *maxima*, *Ouvrardii*, *undulata*, and *voluta*. China, &c. G.

P. tremula.—Fronds 1 to 3 feet long, quadripinnate, deltoid; pinnae linear, caudate at the apex, pinnules linear-

oblong and obtuse, serrate; stipes green, changing to dark-brown. Vars. *elegans*, *Kingiana*, *foliosa*, *grandiceps*, *variegata*, and *Smithiana* are good garden forms. Australia, &c. G.

P. tricolor.—Fronds pinnate, 1 to 2 feet long; pinnae pinnatifid, basal pair branched, green, banded with silvery-white, the centre purplish-red. Malacca.

P. umbrosa.—Fronds 1 to 3 feet long, bipinnate below, pinnate above; pinnae decurrent, linear, acuminate, serrate, deep-green. Var. *crispata* has elegant crisped pinnae. Australia. G.

P. vespertilionis.—Fronds tripinnate, 1 to 3 feet long; pinnules opposite, sessile, obtuse, green above, glaucous below. Australia. G.

TODEA.—There are two sections in this genus, one having stout coriaceous fronds and dense masses of spore-cases; the other and more beautiful having pellucid membranous fronds and sparse distant lines of spore-cases. These resemble the Filmy Ferns, with which they should be grown.

T. africana.—A big coarse Fern with a thick bole-like trunk, bipinnate fronds, 3 to 6 feet long; pinnae sessile, serrate; sori naked, dense, reddish-brown; stipes and rachis long, stout. South Africa. G.

T. hymenophylloides (pellucida).—Fronds bipinnatifid, 10 to 30 inches long, finely divided, vivid-green; stipes and rachis slightly hirsute. New Zealand. G.

T. Moorei (grandipinnula).—A handsome species with broadly ovate tripinnate fronds 12 to 18 inches long, 9 to 12 inches wide, pellucid-membranous; pinnules overlapping, over an inch long, ovate, incised. Old plants have a short thick stem. Lord Howe's Island.



Fig. 729.—*Todea superba*.

T. superba (fig. 729).—Fronds bipinnatifid, spreading, 10 to 20 inches long. The whole frond is everywhere crispate, giving it the appearance of a thick plume; caudex erect. New Zealand. G.

TRICHOMANES.—This genus and *Hymenophyllum* bear the popular name of Filmy Ferns, on account of the peculiarly membranous and pellucid nature of their fronds. The veins in the former are simple, free, with terminal sori surrounded by cup-shaped or tubular involucre.

In cultivation these plants do not require much heat, but they must have a saturated atmosphere and shade. The cæspitose kinds should be planted on rough peat and chopped sphagnum moss, to which may be added some sharp sand and a few lumps of sandstone, whilst those with creeping rhizomes should be provided with branches, stems of Tree-Ferns, or some suitable surface to which they can attach themselves. They are usually grown under large bell-glasses or in Wardian cases.

T. alatum.—Cæspitose; fronds tripinnatifid, lanceolate, 6 to 12 inches long, pale-green. Var. *attenuatum* has pinnatifid fronds 6 inches high; stipes hairy. West Indies.

T. auriculatum.—Fronds 6 to 12 inches long, bipinnatifid, sessile, the lower segment eared. Java.

T. crispum.—Fronds pinnate, 6 to 8 inches long; pinnæ sessile, linear-oblong, obtuse. Tropical America.

T. elongatum.—Fronds bipinnate, triangular, 6 to 12 inches high; segments incised, deep-green; stipes and rachis terete. New Zealand. G.

T. javanicum.—Fronds pinnate, 6 to 12 inches long; pinnæ entire, obtuse, intense deep-green; caudex cæspitose; stipes hairy. Java, &c.

T. Kaulfussii.—Fronds pinnatifid, 8 to 12 inches long; segments lanceolate, lobed, dull-green; stipes hairy. West Indies, &c.

T. Luschnathianum.—Fronds bipinnate; pinnæ sessile; segments deeply and finely incised. Brazil, &c.

T. membranaceum.—Fronds simple, 2 to 3 inches long and 1 to 2 inches broad, sessile, roundish, with margins often incised. West Indies, &c.

T. pinnatum (floribundum).—Fronds pinnate; sterile fronds broad, proliferous at apex; fertile ones narrower, the pinnæ 2 to 3 inches long; involucre exserted, forming a beautiful continuous fringe; caudex erect. Tropical America.

T. Pluma.—Fronds narrow, 6 to 12 inches long; pinnæ cut into hair-like segments, forming a beautiful feather-like bright-green frond. Borneo.

T. Prieurii (anceps).—Caudex erect; fronds 10 to 20 or more inches long, decompound, broadly triangular, deep metallic-green. West Indies.

T. pyxidiferum.—Fronds two to three times divided; segments linear, deep shining-green; caudex creeping. Tropics.

T. reniforme.—Fronds simple, entire, reniform, 4 to 6 inches long, 2 to 3 inches wide, coriaceous, rich bright-green. New Zealand. G.

T. rigidum.—Fronds decompound, triangular, 6 to 12 inches long; segments finely cut, deep sea-green; caudex erect; stipes wiry, half the length of frond. Tropics.

T. scandens.—Frond bipinnate, 12 to 18 inches long; pinnæ lanceolate, bipinnatifid, pale-green; caudex creeping; stipes and rachis hairy. Central America.

T. sinuosum.—Fronds pinnatifid, lanceolate, 3 to 9 inches long, membranous, pale-green, almost transparent; lobes obtuse with hairy margins. Tropical America.

T. tenerum.—Stem slender, creeping; fronds lanceolate, 3 to 6 inches long, pinnate; pinnæ divided into narrow segments. Tropical America.

T. trichodeum.—Fronds tripinnate, 3 to 10 inches long;

segments numerous and hair-like, lively-green; involucre stipitate; receptacles exserted. Tropical America.

T. venosum.—Fronds pinnate, membranous, 4 to 6 inches long; pinnæ small, linear, sinuate, bright-green; caudex slender, creeping. New Zealand. G.

WOODWARDIA.—Bold evergreen Ferns of a highly decorative character, and nearly hardy.

W. orientalis.—Fronds bipinnatifid, 1 to 4 feet long, broad; pinnæ broad, bearing little bulbils, which form young plants; stipes and crown scaly. Japan, &c. G.

W. radicans.—Fronds bipinnatifid, broad, 1 to 6 feet long, viviparous at the apex; segments lanceolate, serrate, bright-green; stipes scaly; caudex stout, creeping. Madeira, &c. A crested variety is very ornamental.

SELAGINELLAS.

Although popularly known as Ferns, the Selaginellas belong to a different natural order. There are over 300 species, some of which form



Fig 730.—Selaginellas.

1, *S. flabellata*. 2, *S. grandis*. 3, *S. lepidophylla*.

minute tufts, whilst others have long scandent stems, copiously branched; many are of creeping (sarmentose) habit; all of them emit roots freely. The leaves are small and scale-like, arranged in two rows along the branchlets. The spores are borne in angular, generally conical spikes at the end of the leafy branches. Nearly a hundred species are in cultivation, but many of them are so much alike that for horticultural purposes the number might be reduced

to about twenty. These would afford interest and be useful in various ways. Many of them are of dimensions large enough to be grown as big specimen plants, others make excellent basket plants, while the small creeping kinds may be employed to form carpets or cushions under large plants. A collection of them, such as that at Kew for instance, is as charming as anything in the Fernery.

Selaginellas are easily managed; they grow quickly, and they may be propagated to almost any extent in a short time. Any light, open soil suits them, the essential point being perfect drainage, so that frequent waterings, which the plants like, will not make the soil stagnant. If good examples are wanted, it is necessary to propagate a fresh stock every year from cuttings which should be put in in February. They may also be raised from spores, but this is a slow and tedious method.

S. affinis.—Stems nearly a foot high, branched freely; leaves flat, overlapping, rather firm, bright-green; branches tasselled and twisted. Very elegant.

S. apus.—Stems slender, trailing, densely matted; leaves minute, pale-green. North America. G. (nearly hardy).

S. atroviridis.—Stems 6 inches high, branched, forming broad shining dark olive-green fronds, almost black in the summer. Tropical Asia.

S. canaliculata.—Stems sarmentose, 3 to 4 feet long; branches 6 to 9 inches long, flexuose, clothed with bright-green oblong pointed leaves. East Indies.

S. caulescens.—Stem stout, branched above, the branches spreading horizontally, giving them the appearance of a large feathery frond, 8 inches wide. Malaya.

S. convoluta (hygrometrica).—Stems densely tufted, forming a dwarf spreading rosette, 6 inches across, of pinnate branchlets. When dry, the branches curl inwards and form a ball, which is sometimes sold under the name of "Resurrection Plant", the branches spreading out flat when placed in water. Tropical America.

S. denticulata.—Stems densely matted, trailing, 6 inches long, pinnately branched; leaves sub-acute, an inch long, flat, toothed, bright-green, turning to bright-red when old. Mediterranean Region. The plant commonly grown for this is *S. Kraussiana*.

S. Emiliana.—Semi-erect, 9 inches high, the fronds as in *S. Martensii*, but more finely divided, and leaves smaller, slightly curled, pale-green.

S. grandis.—Stems 1 to 2 feet high, erect and unbranched, except near the top, where the branches are numerous and form a flat shell-like frond of a bright blue-green colour. Spikes large, tassel-like. Borneo.

S. hæmatodes.—Stems about a foot long, wiry, red, branched above and horizontal, forming a handsome frond a foot wide. A beautiful plant, which should be grown in a large mass. Peru.

S. inæqualifolia.—Stems erect, 2 feet high, branches alternate from the base upwards, horizontal, 5 inches long, the branchlets forming an elegant frond 4 inches wide. India.

S. involvens (Veitchii).—Stems densely tufted, 2 to 6 inches long, branched from the base, forming a flat

rosette; leaves thick, rigid, bright-green; var. *texta* has long, unbranched, chain-like stems. Japan, China, &c.

S. Kraussiana.—The common "Lycopodium" of gardens, usually called *S. denticulata*. Stems trailing, flat, branched freely, bright-green, forming a turf-like mass. There are many varieties, of which *Brownii* is a compact and pretty one. Africa. Hardy in the warmer parts of England.

S. lævigata.—Stems erect, 12 to 18 inches long, branched only in the upper half, the branches spreading and forming a wide elegant frond in which the erect ridge-like rows of dark-green leaves are striking; var. *Lyalli* is a more graceful form. Madagascar.

S. Martensii.—Stems 6 to 12 inches long, the lower half prostrate, the upper erect, pinnately branched, flat, bright-green, the leaves crowded. A common garden plant, of which there are several varieties, including a variegated form. Mexico.

S. stenophylla.—Stems erect, 6 to 12 inches high, branched, as in *S. Martensii*, but more delicately divided and coloured pale-yellow; var. *albospica* has white tassel-like spikes. Mexico.

S. uncinata (cæsia).—Stems trailing, with alternate branches, 3 inches long, triangular in outline, covered with flat imbricating leaves of a steel-blue colour, varying with the light. A pretty and useful plant, as easy to cultivate as the commonest. China.

S. Wallichii.—Stems stout, 3 feet or more high, with horizontal alternate branches, which are frond-like, 9 inches by 3 inches, plumose, the tassel-like drooping spikes adding to their beauty. India.

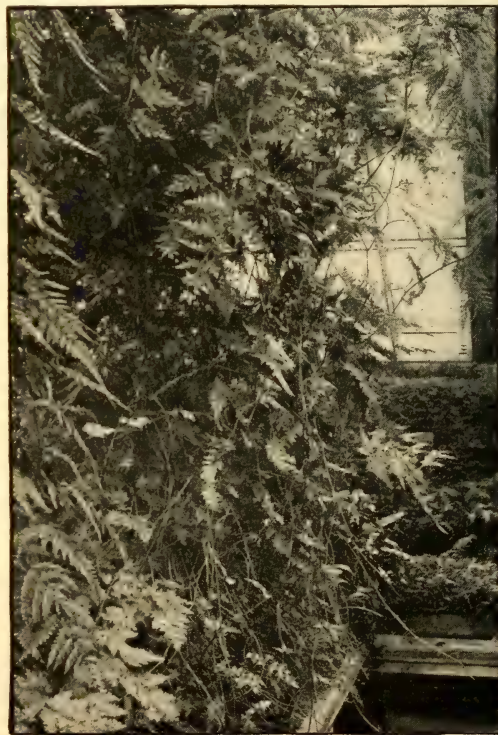


Fig. 731.—Selaginella Willdenovii.

S. Willdenovii (cæsia-arborea) (fig. 731).—Stems climbing, attaining a length of 20 feet or more, wiry when old, reddish, bearing frond-like branches 2 feet long, the scale-

like leaves of a steel-blue colour. It forms a tangle of stems and branches in a few months under liberal cultivation. India.

LYCOPODIUMS.

A large genus represented in our native flora by the Club-Mosses (*L. clavatum*, *L. alpinum*, &c.). They are all of striking appearance and exceptionally interesting, but unfortunately they are difficult to cultivate. Some of the tropical species are, however, represented in good collections—at Kew, for instance, where they are

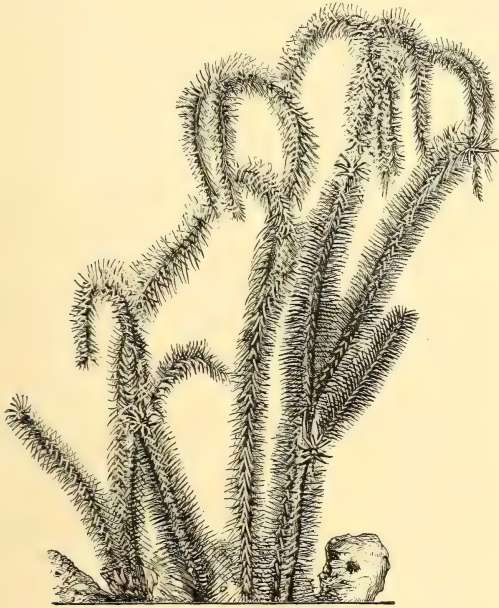


Fig. 732.—*Lycopodium squarrosum*.

grown in teak baskets of sphagnum, and suspended near the roof-glass in a tropical moist house. Here they grow with vigour, pushing up annually their succulent stems clothed with Pine-like leaves and ultimately with terminal tassels of spore-bearing branchlets. The best of them are *L. Phlegmaria*, *L. squarrosum* (fig. 732), and *L. taxifolium*.

CHAPTER XXXIV.

FERNS—HARDY.

GENERAL TREATMENT—HARDY FERNS UNDER GLASS—
SELECT LIST OF HARDY FERNS.

Hardy Ferns are rich in beauty and variety. Many of them are deciduous, the fronds perishing during the winter, to be succeeded, however, by a burst in spring of new fronds, which retain their freshness until winter comes again.

They are useful either for growing in pots for the conservatory or other plant-houses, or for furnishing rockeries in the open garden (see fig. 733). The term rockery is a very elastic one; it may mean an elaborate arrangement of stones, or artificial rock, or it may be applied to a conglomeration of brick-burrs, clinkers, stumps of trees, roots, &c., arranged for the accommodation of certain plants. Blocks of natural, irregularly-shaped rough stone are of course the best, but they are not always obtainable, and we must perforce use whatever material can be got; and after all, the material itself is of less consequence than the manner of its arrangement. A suitable rockery may be formed with very little expense in the following manner:—

Peg out on the flat surface a winding walk made to conform to the surroundings of the place where the fernery is to be formed. Then begin at one end and remove the soil from the walk, gradually sinking it lower, and sloping the sides as the work goes on. The soil so excavated should be placed on the banks on either hand, mixing with it stone, brick rubble, broken pots, or any other material suitable for drainage. The Ferns should be planted in good turfy loam. The depth of the lowest part of the walk below the ground-level should be in proportion to the size and nature of the ground. When the ground work is done, the mounds or banks should be finished off as rockeries with whatever material of rustic appearance can be obtained.

It is important that a suitable position should be assigned to each plant. For example, *Osmunda* and *Struthiopteris* should have the wettest places; the mural species, such as *Asplenium Ruta-muraria*, *A. Trichomanes*, *A. viride*, and *A. officinarum*, should have light positions; robust growers should be placed where they will get room, both at root and top. A shaded corner or a small cave might be made to accommodate *Trichomanes*, *Hymenophyllums*, and *Todeas*. Steps can be made in suitable places, and rendered permanent by placing rustic pieces of wood along them; a small rustic bridge, and even a shallow pool, might be added if space and means allow. Shell-gravel or shingle is the best for surfacing the walks; cement or asphalt should be avoided.

Hardy Ferns when grown in pots are not easily kept free from thrips, especially when used for indoor decoration. If possible, they should be wintered in a cold frame, or the

stronger-growing kinds should be plunged up to the rims of their pots in a sheltered place in the open ground, placing only the more tender kinds in a frame.

One great error is often made in drying off deciduous Ferns by withholding water when the fronds are fading or have died down. No Fern should be allowed to go short of water at any time of the year. Some of the rock species when growing wild often withstand lengthened periods of drought, but under cultivation it is

dangerous. In some seasons they will require more water than in others. In late autumn and winter only those plants which the rains and dews do not reach may need watering, but in spring and summer it is scarcely possible to over-water them. Many Ferns are perfectly happy in positions exposed to full sunlight if only they can obtain sufficient moisture at the root. That such is the case is evident from the growth of some of our native Ferns on open commons, in sunny stream-sides, &c.



Fig. 733.—Hardy Fern Rockery.

That the smaller species are found only in shaded positions may be due to their being forced from sunnier ones by plants of stronger growth. Many plants in nature grow where they can, not where they would prefer. It is as well to bear this fact in mind when constructing a fernery. With few exceptions Ferns are as happy under bright sunshine as the general run of plants, but they must have plenty of water.

Snails, slugs, and woodlice are the chief enemies of Ferns in the open garden, and at all times they should be diligently sought for and destroyed.

Hardy Fernery under glass.—The fitness of hardy Ferns to form rockeries, or as border plants in unheated structures, is not recognized to the extent they deserve. In many gardens there are unheated corridors and other structures for which hardy Ferns are well adapted. Narrow

borders should be made on each side of corridors, and suitable Ferns be planted in them. The evergreen kinds, especially the Japanese, North American, and other exotic species, should be selected, as they preserve their beauty in winter better under glass than in the open air.

In gardens where there is an old disused house which is not worth renovating, by disconnecting the heating apparatus it may be turned into a hardy fernery, in which much beauty with a minimum of trouble may be obtained.

SELECT LIST OF HARDY FERNS.

ADIANTUM Capillus-Veneris.—Rhizome creeping; fronds 6 to 12 inches long, bi- or tri-pinnate; pinnules obliquely fan-shaped, bright-green. Cosmopolitan (Britain). Var. *incisum*, found in Ireland, differs in having the pinnules cut into narrowish segments; *cornubiense*, found in Cornwall, has large fringed pinnules.

A. pedatum.—Creeping, the fronds lateral, 1 to 2 feet in length, with linear branches; pinnules developed on one side of the midrib only, oblong, obtuse, bright-green. North America.

ALLOSORUS crispus (Parsley Fern).—Fronds bi-tripinnate, 6 to 10 inches long, bright-green, fertile ones contracted. Prefers shade and good drainage. Europe (Britain).

ASPIDIUM [POLYSTICHUM].—The Shield Ferns comprise about fifty species. They are distinguished by their globose dorsal sori and superior, round, peltate involucre. The two British species belong to the section Polystichum, having free veins. The fronds are mostly rigid in texture and spinulose.

A. acrostichoides.—Fronds pinnate, 12 to 20 inches long; pinnae lobed, bristly, the upper pinnae fertile and contracted. North America.

A. aculeatum.—Fronds evergreen, bipinnate, lanceolate, 2 to 3 feet high, 6 to 8 inches wide; the pinnules sessile, wedge-shaped, the basal one auriculate. The stipes are densely clothed with large chaffy scales. Cosmopolitan (Britain).

Var. *angulare*.—Fronds tripinnate, pinnules ovate, stipes clothed with chaffy scales. There are an immense number of varieties, some of which are:—*cristatum*, fronds 2 to 3 feet long, apex densely crested; *diversilobum plumosum* has fronds of exceptional elegance and richness; *gracile*, fronds 1 to 2 feet long, pinnules small, spiny-toothed; *grandiceps*, pinnae crested, the frond surmounted with a dense corymb; *parvissimum*, fronds a foot long, pinnules blunt, coriaceous; *Pateyi* is densely imbricated; *polydactylum*, fronds narrow lanceolate, a foot high, ramose, very handsome; *proliferum*, fronds lanceolate, 12 to 18 inches high, producing little bulbils along the rachis; *proliferum Wollastoni* is very handsome; *rotundatum* has roundish pinnules, not spiny. Other beautiful varieties are *grandipendens*, *imbricatum*, *plumosum*, *tripinnatum*, &c.

A. caryotideum.—Fronds evergreen, 2 to 3 feet long, pinnate; pinnae lanceolate, auriculate, 4 to 6 inches long, pale-green. Nepal.

A. falcatum.—Fronds pinnate, evergreen; 2 to 3 feet long; pinnae somewhat falcate, 4 to 6 inches long, deep shining-green. Tropics Old World.

A. falcinellum.—Caudex thick, erect; fronds pinnate, evergreen, 12 to 18 inches long; pinnae serrate, bright-green; stipes densely scaly. Requires slight protection. Madeira.

A. Lonchitis.—Fronds evergreen, pinnate, rigid, 9 to 18 inches long; pinnae entire, auriculate, spiny, intense green. North temperate zone (Britain).

ASPLENIUM Adiantum-nigrum.—One of the most beautiful of hardy Ferns. Fronds evergreen, triangular, bi-tripinnate; the pinnules ovate, dentate, darkshining-green; stipes black. It flourishes most luxuriantly in sandstone. Var. *grandiceps* has the fronds tasselled. Europe (Britain).

A. alternans.—Fronds evergreen, 6 to 8 inches high, pinnatifid or sinuose. Resembles *A. Ceterach*, but has no chaffy scales. Himalaya.

A. angustifolium.—Fronds deciduous, pinnate, 10 to 20 inches long, sterile much broader than fertile; pinnae linear-lanceolate, light-green. North America.

A. Ceterach.—Fronds leathery, pinnatifid, 3 to 6 inches long, densely clothed beneath with chaffy scales. Prefers limestone. Europe, &c. (Britain).

A. ebenum.—Fronds evergreen, pinnate, 6 to 12 inches long; pinnae auriculate, crenate, deep-green, the rachis black. North America.

A. Filix-femina (Lady Fern).—Fronds deciduous,

herbaceous, bi- or tri-pinnate, lanceolate, 1 to 4 feet high; pinnules sessile, ovate, dentate. The varieties are very numerous:—*corymbiferum* has crested fronds 12 to 20 inches high; *crispum* is dwarf, with tasselled, variable fronds; *Frizelliae* has pendulous fronds 18 inches long and 1 inch wide, the small dentate pinnæ overlapping each other; *Applebyanum* is similar, with a much-branched apex; *grandiceps* has lanceolate fronds, the apex forming a dense much-branched crest; *plumosum* has broadly-lanceolate fronds 3 to 4 feet long, thin in texture, finely divided; *Victoriae* has crested fronds and pinnae, the latter forking at the base, and crossing so as to form a letter X; very distinct and handsome. Other good forms are:—*apiculatum*, *acrocladon*, *apuaeforme*, *coronatum*, *Elworthii*, *gracile*, *multiceps*, *multifidum*, *polycladon*, *polydactylon*, *Stansfeldi*, &c.

A. fontanum.—Fronds 4 to 6 inches high, evergreen, bipinnate, broadest in the middle; pinnules toothed, deep-green. Europe.

A. germanicum.—Fronds 4 to 6 inches high, pinnate; pinnae alternate, deeply divided at the apex, light-green. Should be planted amongst pieces of sandstone and decayed vegetable mould. Europe (Britain).

A. lanceolatum.—Fronds evergreen, bipinnate, 6 to 18 inches high; pinnules deeply toothed. Var. *microdon* has pinnate fronds and triangular pinnae. Europe (Britain).

A. lanceum.—Fronds simple, lanceolate, 6 to 15 inches long, undulate, bright-green; the regular double lines of brown sori are well-marked peculiarities. Japan and China.

A. macrocarpum pictum.—Fronds 6 to 18 inches long, stipes and rachis red; pinnae deep-green, those next the costa red and white. Japan.

A. marinum.—Fronds evergreen, 6 to 12 inches high, narrow, pinnate; stipes purplish-black. Requires care and special attention. The most distinct varieties are *ramosum*, *trapeziforme*, *bipinnatum*, and *crenatum*. Europe (Britain).

A. thelypteroides.—Fronds deciduous, pinnate, lanceolate, 1 to 2 feet long, light-green; pinnules deeply divided. North America.

A. Trichomanes.—Fronds evergreen, pinnate, 3 to 12 inches long, linear; pinnae small, oblong-ovate, deep-green; stipes blackish-purple. The most distinct variations are *incisum*, *Moulei*, *ramosum*, *multifidum*, and *cristatum*.

CYRTOMIUM. See *Aspidium*.

CYSTOPTERIS.—Small elegant Ferns, with soft deciduous bipinnate or tripinnate fronds. They prefer a shady, moist situation.

C. bulbifera.—Fronds bipinnate, 1 foot long, erect, dull-purple, changing to pale-green, and bearing on the under side of the rachis quantities of bulbils, which fall off when mature and quickly become plants. North America.

C. fragilis.—Fronds bi- or tri-pinnate, 6 to 12 inches long, dark-green. The following are fairly-marked varieties:—*angustata*, narrower in all its parts; *dentata*, pinnules bluntly-toothed; *Dickiana*, pinnae dense, bluntly-toothed, and dark-green. Cosmopolitan (Britain).

C. montana.—Handsome, fronds 6 to 12 inches long, bright-green; rhizome slender, creeping. Europe (Britain).

DICKSONIA punctilobula.—Fronds deciduous, subtripinnate, broadly-triangular, the segments obtuse, dentate, light-green, slightly pubescent. North America.

DIPLAZIUM. See *Asplenium*.

GYMNOGRAMME japonica.—Fronds pinnate or bipinnate, 1 to 2 feet high; pinnae lanceolate, 6 to 10 inches long, dark-green above, paler below. A distinct and handsome Fern. Japan, &c.

HYMENOPHYLLUM.—*H. tunbridgense* and its variety

unilaterale, both natives of this country, have pinnate fronds 1 to 6 inches long, the variety being distinguished by the smooth (not serrate) edges of the involucre. Should be grown under a hand-light or in a moist cave.

LASTREA. See *Nephrodium*.

LOMARIA *alpina*.—Sterile fronds pinnate, lanceolate, almost prostrate, 4 to 6 inches long, dark-green. South temperate zone.

L. Boryana (chilensis).—A bold-growing species, fronds 3 feet long, pinnate; sterile pinnae broad, dark-green, fertile much contracted. Chili.

L. Spicant.—Fronds evergreen, sterile pinnatifid, lance-

olate, spreading, deep-green; fertile erect, pinnate, contracted. Europe (Britain). Some of the best of the numerous varieties are:—*caudata*, *imbricata* or *crassicaule*, *multifurcata*, *plumosa*, *ramosa*, and *trinervia*.

NEPHRODIUM *œmulum*.—Fronds evergreen, tripinnate, triangular, 1 to 3 feet high, with a hay-like perfume; pinnales lobed, dentate, bright-green. Britain and Madeira.

N. cristatum.—Fronds bipinnate, narrow-oblong; pinnae broadly triangular, pinnules toothed. North America and Europe (Britain).

N. dilatatum (reduced to a sub-species under *N. spinulosum* by some authors).—Fronds evergreen, 2 to 4 feet

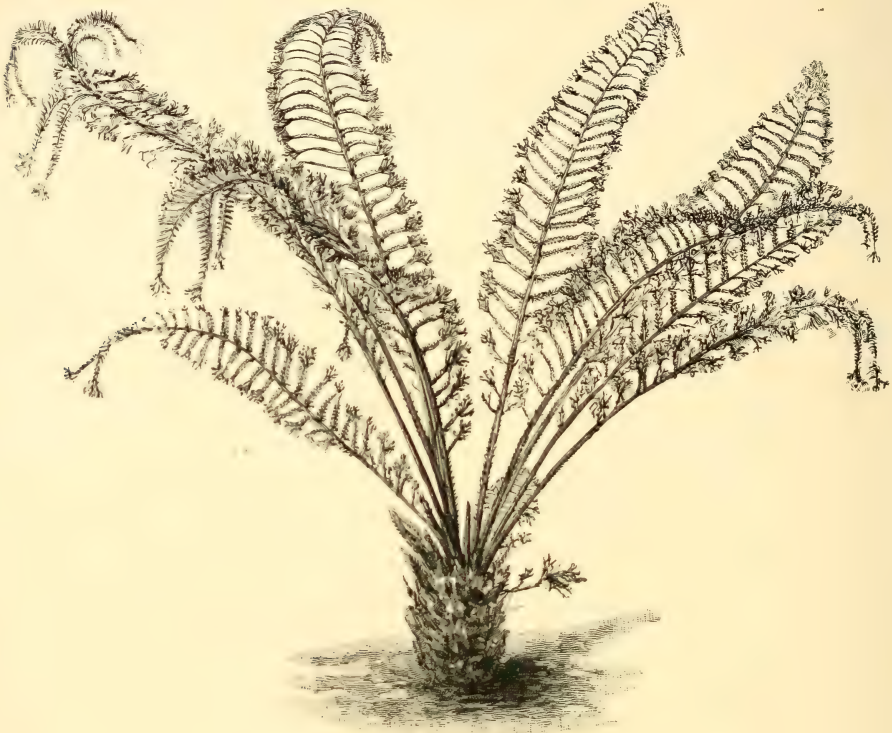


Fig. 734.—*Nephrodium Filix-mas cristata*.

long, ovate, bi- or tri-pinnate, the basal pair of pinnae somewhat triangular; stipes clothed with large brown chaffy scales. Cosmopolitan (Britain). Some of the best varieties are:—*Chanterix*, fronds with an elongated apex; *dumetorum*, dwarf, the stipes covered with glands; *lepidotum*, exceptionally scaly, fronds broadly-ovate.

N. erythrorum.—Fronds bipinnate, 2 to 3 feet long; sori large, the indusium bright-red, giving a peculiar beauty to the under side of the fronds. Japan.

N. Filix-mas (Male Fern).—One of the most beautiful of our native Ferns. Fronds bipinnate, lanceolate, 2 to 4 feet long; pinnules oblong-obtuse, deep-green. Cosmopolitan. The varieties of it are very numerous, and some of them are worthy of special cultivation in pots. Some of the best are:—*Bollandæ*, fronds undulate, 12 to 18 inches long; *cristata* (fig. 734), pinnae beautifully crested; *cristata angustata*, fronds less than 2 inches wide, pinnae densely crested and curly; *grandiceps*, 12 to 18 inches long, the pinnae forked, forming a broad crested head; *paleacea*, fronds 3 to 4 feet long, tinged with yellow when young, stipes clothed with golden chaffy scales; *Pin-*

dari, fronds 1 to 2 feet long, and narrow—sometimes called *N. pseudo-mas*.

N. Goldianum.—Fronds bipinnate, triangular, spreading, 10 to 20 inches long, bright-green, bold and handsome. North America.

N. hirtipes (atratum).—Fronds evergreen, pinnate; pinnae toothed, deep-green; stipes clothed with dark chaffy scales. Japan and East Indies.

N. marginale.—Fronds large, bipinnate, lanceolate, 1 to 2 feet long; pinnules oblong, obtuse, crenate, bright-green. North America.

N. montanum.—Fronds pinnate, 1 to 3 feet long, bright-green, fragrant; pinnae linear-lanceolate, deeply pinnatifid, spreading. The variety *crispa* has crisped pinnules; *cristata* has pinnae beautifully tasselled; *Novelliana* has linear and erose pinnae, deeply cut. Europe (Britain).

N. rigidum.—Fronds evergreen; pinnules oblong, dentate, glaucous. North temperate zone (Britain).

N. Sieboldii.—Fronds coriaceous, pinnate, 1 to 2 feet long; pinnae, from three to four pairs, about 6 inches long and 1 inch broad, dark-green; stipes scaly. Japan.

N. spinulosum.—Caudex decumbent, bearing distant broad ovate pale-coloured scales; fronds erect, bipinnate. (See also *N. dilatatum*.) Europe (Britain).

N. Standishii.—Fronds tripinnate, triangular, 2 to 3 feet long; pinnæ and pinnales closely set, giving the frond a dense and massive appearance. Japan.

N. Thelypteris.—Caudex slender, creeping; fronds bipinnate, erect, 1 to 3 feet long; under surface quite covered with dark-brown sori. It delights in a damp, boggy situation. Temperate regions (Britain).

NOTHOCHLENA Marante.—Fronds bipinnate, broadly lanceolate; pinnules 4 to 10 inches long, deep-green, clothed beneath with reddish-brown scales. Southern Europe, &c.

N. vestita.—Fronds bipinnate, narrow lanceolate, 6 to 12 inches long; pinnules crenate, pale-green; stipes and frond furnished with reddish hairs. North America.

ONOCLEA.—A small genus of deciduous Ferns, having dimorphous fronds, and a peculiar membranous indusium enclosing each sorus. Rich loam, shade. *O. sensibilis* has fronds 1 to 2 feet long; sterile triangular, pinnate-pinnatifid, with pale-green segments, fertile bipinnate, much contracted, spicate. North America.

O. germanica (pennsylvanica).—Sterile fronds 1 to 3 feet long, pinnate, the pinnæ pinnatifid, spreading; fertile fronds simply pinnate, contracted, with revolute margins. Europe and North America.

OSMUNDA.—Noble handsome plants; fronds leathery or herbaceous, pinnate or bipinnate, springing from a tufted caudex. They delight in abundance of water, shade, and shelter, and should be planted in peat.

O. cinnamomea.—Deciduous, fertile fronds densely clothed with ferruginous hairs; sterile fronds shorter, glaucous. North America.

O. Claytoniana (interrupta).—Fronds upwards of 2 feet in length, erect. The great peculiarity of this species lies in its having the middle pinnæ contracted and sporangiferous, hence the name *interrupta*. North America.

O. regalis (Royal Fern).—Fronds erect, bi- or tri-pinnate, 3 to 9 feet long; pinnules 2 inches long, auriculate, light-green; upper portion of frond fertile, paniculate. There are several varieties, viz. *corymbifera*, *cristata*, *japonica*, *palustris*, *purpurascens*, &c. Temperate regions (Britain).

O. spectabilis.—Fronds bipinnate, 2 feet long; pinnules 3 inches long, bright-green, upper portion of the frond contracted and sporangiferous. North America.

POLYPODIUM alpestre.—Fronds deciduous, bipinnate, erect, 12 to 24 inches long, with lanceolate, serrated, dark-green pinnules. The variety *humile* has fronds a foot high, the pinnæ inclining downwards, and the stipes very short. North temperate zone (Britain).

P. Dryopteris.—Caudex slender, creeping; fronds deciduous, ternate; pinnæ deeply incised, bright-green. Var. *Robertianum* has tripinnate fronds, twice divided, dull-green. North temperate zone (Britain).

P. Krameri.—Fronds bipinnate, pale-green, 5 inches long, articulated; pinnæ deflexed, oblique, crenate; sori scattered. Japan.

P. Phegopteris.—Creeping, with deciduous, pinnate, triangular fronds; pinnæ sessile, the lower pair refracted, the whole surface hirsute, dull-green. North temperate zone (Britain).

P. vulgare.—Caudex stout, creeping, clothed with brown chaffy scales; fronds evergreen, pinnatifid, linear-oblong, 12 to 18 inches long; pinnæ bluntly oblong, dark-green; sori golden-yellow. North temperate zone (Britain). There are numerous varieties, some of the handsomest being:—*cambricum* (fig. 735), fronds 9 to 18 inches

long, pinnæ dense, overlapping, lobed, invariably barren; *crisatum*, pinnæ all crested, forming a beautiful tuft; *omnilacerum* is like *cambricum*, but larger, the pinnæ lengthened into a tail-like point, not imbricate, fertile; *pulcherrimum* also resembles *cambricum*, but the pinnæ are broad and dense, overlapping, serrate, and fertile; *semilacerum* has fronds 12 to 18 inches long, deeply divided, the sori large and conspicuous; *cornubiense* is so

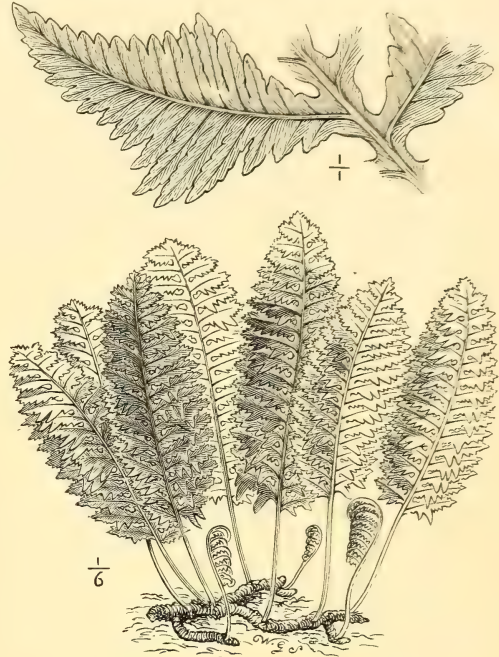


Fig. 735.—*Polypodium vulgare cambricum*.

much divided as to resemble *Davallia dissecta*. *Fowleri* differs from this in being permanently decomposed.

PTERIS aquilina (Bracken).—Fronds deciduous, 1 to 6 feet, tripinnate. Although a common native Fern, it is worthy of a place in the garden.

P. scaberula.—Rhizome creeping; fronds tripinnate, triangular, 10 to 15 inches long, pinnules finely cut; stipes hairy. A very elegant species. Should have a covering of dry leaves in winter. New Zealand.

SCOLOPENDRIUM.—The British representative (*S. vulgare*) has produced an immense number of varieties, some of which are grotesque, others extremely handsome, and nearly all are valuable additions to the out-door fernery. The indusiate sori are linear, arranged in opposite parallel contiguous pairs.

S. (Camptosorus) rhizophyllum (Walking Fern) (fig. 736).—Fronds simple, 6 inches long, cordate, tapering to a point, where they take root, proliferous. Prefers shade. North America.

S. vulgare (Hart's-tongue).—Caudex erect; fronds simple, ligulate, cordate at the base, entire, evergreen, 6 inches to 3 feet long, the sori dark-brown, conspicuous. The varieties are endless:—*acrocladon* has narrow fronds, the apex branched and crested; *Claphami* has the margins lobed, the apex forked and crested; *columnare* has the rachis fringed with a narrow wing-like membrane, leaving only a dense multifid head; *Coolingii* is about 4 inches high, as broad as long, much branched, almost spherical; *crispum* has fronds 12 to 18 inches long, crenate and undulate; this form has sported into many

others, of which *fertile*, *minus*, and *latum* are the most peculiar and distinct; *cristatum* has fronds repeatedly forked; *laceratum* has beautifully crested and curled fronds; *marginatum* has a continuous raised line near the margin on the under side which often produces



Fig. 736.—*Scolopendrium rhizophyllum*.

thorn-like processes, edges of the frond deeply cut; *multifidum* has fronds much branched and forked; *Stansfieldi* is like *crispum*, but the edges are fringed and the apex crested.

STRUTHIOPTERIS. See *Onoclea*.

TRICHOMANES *radicans* (Killarney Fern).—Fronds broadly-triangular, decompound, pellucid, rich olive-green, and from a few inches to 2 feet in length. Requires protection from drought and sunshine.

WOODSIA.—Dwarf Ferns, mostly confined to mountain regions of temperate climes, and known by their globose sori, set within a delicate involucre.

W. alpina and *W. ilvensis* are two rare British species, with a tufted caudex and pinnate deciduous fronds; pinnæ somewhat triangular in the former, oblong-obtuse, hairy beneath in the latter.

W. obtusa.—Fronds deciduous, 6 to 12 inches long, bipinnate; pinnules deeply pinnatifid; pinnæ somewhat triangular, pale-green. North America.

W. polystichoides.—Fronds deciduous, pinnate, densely clothed with chaffy scales; pinnæ broad, obtuse, crenate, dark-green. Japan.

WOODWARDIA *areolata*.—Deciduous sterile fronds sub-pinnate, erect, 1 foot or more long; pinnæ broad, serrate on the edges, bright-green; fertile fronds narrower; rhizome creeping. North America.

W. japonica.—Fronds evergreen, pinnate, 1 to 2 feet long; pinnæ broad, pinnatifid, margins serrate, dark-green. Japan.

W. virginica.—Caudex creeping; fronds deciduous, 1 to 2 feet long; pinnæ sessile, lanceolate, pinnatifid, segments somewhat ovate; margins plane, pale-green. North America.

CHAPTER XXXV.

PALMS AND CYCADS.

PROPAGATION—INSECT PESTS—LIST OF PALMS—CYCADS.

PALMS.

Palms form a distinct and important group in the vegetable kingdom. Over a thousand species are known, the majority of which are natives of tropical countries, and therefore in this country require a high temperature for their cultivation. A few are found in extra-tropical countries, and these may be grown in a greenhouse temperature. One species only, *Trachycarpus* (*Chamaerops*) *excelsa*, a native of China, is sufficiently hardy to live out-of-doors in the warmer parts of these islands.

Although between four and five hundred species have been introduced into English gardens, not more than a tenth of these may be called popular garden plants. Like the Grasses and Bamboos, to which Palms are related, many of the species closely resemble each other in vegetative characters, differing only in their flowers and fruits; when young they are so difficult to discriminate that several species may easily be grown under the same name.

Many of the species grown as decorative plants are, when fully developed, quite large trees, some having straight cylindrical trunks 50 feet high, supporting a large crown of pinnate or palmate leaves; but as they assume a decorative character when small, they are largely utilized for the ornamentation of rooms, &c. Such popular sorts as *Livistona sinensis*, *Seaforthia elegans*, *Cocos flexuosa*, *Howea Fosteriana*, and *Trachycarpus excelsa* may be seen at Kew from 40 to 50 feet high.

With very few exceptions Palms are propagated only from seeds, which are imported in large quantities from countries where they grow freely. Millions of seeds are annually imported into England alone of such favourites as *Kentia*, *Cocos*, and *Livistona*. The seeds should be sown in pans or boxes of loamy soil, and kept warm and moist until they have formed a leaf; they should then be planted singly in small pots. Tropical conditions are preferable for young seedlings of even temperate species until they have made two or three leaves. All Palms without exception enjoy a strong loamy soil, and a liberal amount of moisture both at the root and overhead, and from germination onwards. Where large quantities of seeds are



CYCADS IN THE PALM HOUSE, KEW



VIEW IN GREAT PALM STOVE, KEW

sown, a bed is prepared for them in a warm pit and the seeds are sown thickly on this. As the seedlings come up they are carefully drawn out of the bed and potted singly.

Plants intended for use in decoration when small, should be grown in small pots. If potted firmly in good yellow loam, and fed with a concentrated manure such as guano or Clay's or Davies' fertilizers, they make healthy growth when kept in pots which would otherwise be too small for them. They may be repotted into a size larger pot when the roots are so crowded as to lift the soil above the rim of the pot. This treatment may be continued when the plants are large. Growers of Palms for market obtain large specimens in pots which appear absurdly small by keeping the plants in small pots and feeding them liberally. Manures in which nitrate of soda is a principle are excellent for producing rich green foliage.

If the plants are to be employed in the decoration of halls, staircases, or wherever the conditions are more or less trying, they should be prepared for this by exposure to plenty of light and air for a few weeks. Their treatment generally should be less liberal when once they have attained the desired size. Where convenient the plants should be changed from the decorating service to the greenhouse often enough to prevent permanent injury. In dry rooms the pots containing the plants should stand in saucers containing water.

All the tropical species may be grown in a moist warm house, and although they will bear exposure to bright sunshine, they are happy when shaded along with the other plants usually grown with them in tropical houses. Many Palms will endure a much lower temperature than they ever experience in nature; even distinctly tropical species wintering safely in houses in which the temperature falls to 55° or even 50°. They all like plenty of water at the roots, a daily soaking being not too much for them in summer when they are growing freely. The most suitable soil for them is a good yellow loam, although some of the finer-rooted species, such as *Calamus ciliaris*, *Cocos Weddelliana*, and *Thrinax Morrisii* prefer a mixture of loam and leaf-mould, or loam and peat.

Whilst pot or tub-culture for Palms is as a rule most convenient, they may be grown as well or better when planted out in beds in lofty houses, such as conservatories. For this purpose those species should be selected which are not likely to grow too large, or which can easily be replaced should their removal on this account be

necessary. In the list which follows, the letter G indicates those species which may be grown in a conservatory, where the minimum temperature in winter is not below 45°. For further directions see under *The Conservatory*, p. 525, and for Palms suitable for the open air in summer, see under *The Sub-tropical Garden*, p. 641.

Insect Pests.—All Palms are liable to the attacks of such plant-pests as mealy-bug, scale, thrips, and red-spider, and although they do not suffer in health unless badly infested, the leaves are soon disfigured. Where there are not many plants, periodical washing with strong soapy water will keep them clean. For large collections a weekly syringing with a solution of paraffin or quassia-chips, or soft soap and sulphur, serves as a preventive and does not hurt the plants. If the stems or old leaves are badly infested with scale, they may be painted over with a strong cream-like mixture of soft soap, sulphur, and warm water, which should be allowed to remain on a week or so; when washed off it will bring away with it all the insects with which it has been in contact.

Acanthophoenix (Areca).—A small tropical genus, found only in Mauritius and Bourbon. Mature examples have smooth stems 60 feet high, and pinnate leaves 6 to 12 feet long. Young plants have arched pinnate leaves clothed on both sides with long spines which are needle-like on the sheathing base of the leaf-stalk; the under side of the pinnae is silvery. They require stove treatment. *A. crinita* (Herbstii), *A. rubra*.

Archontophoenix.—Two well-known garden Palms are placed in this genus by botanists, namely, *Ptychosperma Alexandræ* and *Seaforthia elegans*. They are largely grown from seeds annually imported from Australia, their native country, and also from other countries where they have become naturalized. Full-grown specimens have stems 60 feet high, and large, stout, pinnate leaves. The seeds are pea-like with a mace-like covering. *A. Cunninghamii* (*Seaforthia elegans*), leaves green on both sides; *A. Alexandræ*, leaves glaucous beneath. G.

Arenga.—Large trees with enormous pinnate leaves, the pinnae with jagged ends, glaucous beneath, the leaf-stalk split at the base into numerous long black fibres, the strongest of which are used as arrows for blow-pipes. *A. saccharifera* yields the sugar known in India as "jaggery". Young plants are graceful and sufficiently sturdy to bear rough treatment. They require a stove temperature. *A. Bonnetii*, *A. saccharifera*, *A. Wightii*.

Astrocaryum.—Stems of mature plants 20 to 40 feet high, with stout, flat, dark-brown spines in spiral rings; leaves arching, pinnate, very spiny, glaucous beneath. When young they are elegant and ornamental, notwithstanding their spines. Plants 10 feet high will flower annually, their large, boat-shaped sheaths being remarkable. All natives of tropical South America. *A. aculeatum*, *A. Mexicanum*, *A. rostratum*.

Attalea.—Comprises about twenty species, all South American, with tall, ringed stems, and large, spineless, pinnate leaves. *A. Cohune*, the "Cohune Nut", develops noble leaves 20 feet long before it has formed a stem.

Young plants are of graceful habit, and sufficiently robust to be used for ordinary decorative work. Stove treatment. *A. Cohune*, *A. funifera*, *A. spectabilis*.

Brahea.—Closely allied to *Thrinax*. Fully-developed plants have stems 30 feet high, surmounted by a head of fan-shaped leaves 7 feet across, rachis (leaf-stalk) short and stout, spinous. They are natives of Mexico, and thrive in a greenhouse temperature. *B. calcarata*, *B. dulcis* (*Thrinax tunicata*), *B. lucida*, *B. nobilis*.

Calamus.—A very extensive genus, confined chiefly to the tropics of Asia; mostly of climbing habit, some attaining a stem-length of several hundred feet. These stems are known as "Rattans", and are used, when split, for chair-bottoms, &c. When young they are invariably graceful, having slender, spinous stems and feathery, pinnate leaves. They require stove treatment. *C. asperimus*, *C. ciliaris*, *C. Oxleyanus*, *C. tenuis*.

Caryota.—Large trees, sometimes of tufted habit, sometimes with single stems 50 feet high, bearing enormous bipinnate leaves, the pinnæ shaped like fishes' fins. They are singular in their mode of flowering, the plant growing to its full height before developing an enormous drooping cluster of flowers; this is succeeded by lateral clusters until almost the base of the stem is reached, when the plant perishes. Young plants are invariably elegant and singular in being bipinnate. *C. ochlandra* from China may be grown in a greenhouse; the others are tropical. *C. Blancoi*, *C. Cumingii*, *C. majestica*, *C. mitis* (*sobolifera*), *C. ochlandra*, *C. Rumphiana*.

Chamædorea.—About 60 species of erect, slender-stemmed Palms, all natives of Tropical America. They vary in height, and several are climbers; some have bilobed leaves, others are elegantly pinnate. They flower freely even when small; their spadices being brightly coloured, and the flowers powerfully fragrant. Some are stoloniferous. A few may be grown in a greenhouse, the others prefer the stove and shade. *C. Arenbergiana*, *C. corallina*, *C. elatior* (G), *C. Ernesti-Augusti*, *C. gracilis*, *C. Sartori*, *C. scandens* (G).

Chamærops.—Only one species rightly belongs to this, namely, *C. humilis*, interesting as being the only native European Palm. In some parts of Sicily and Spain it spreads over the uncultivated sandy tracts just as the common Bracken does with us. It is hardy in South Cornwall and the Isle of Wight. There are numerous varieties, such as *macrocarpa*, *tomentosa*, *elegans*, &c. Excellent for a greenhouse or conservatory, as it grows slowly and rarely exceeds 12 feet in height.

Chrysalidocarpus (*Areca*) *lutescens*, of Madagascar, but now common in tropical countries. A most useful Palm, forming graceful tufts of yellowish Bamboo-like stems and elegant pinnate leaves, and it bears rough treatment very well. Small plants are much used for the decoration of dinner-tables. Market-growers often sow three seeds close together, and thus obtain attractive little triplet pot-specimens in about three years.

Cocos.—There are thirty species, including the "Cocoa-nut" (*C. nucifera*) and several of the most useful of all garden Palms, *C. Weddelliana* and *C. plumosa* being unrivalled as decorative plants. Some of the species form very large trees, *C. plumosa*, for instance, being represented at Kew by a giant 60 feet high, with dark-green plume-like leaves 20 feet long. *C. Weddelliana* rarely grows more than 6 feet high. It is grown in enormous numbers by nurserymen, plants being saleable when less than two years old. All the species are natives of the western tropics, *C. nucifera* being common in all tropical countries. *C. campestris* (G), *C. insignis* (*Glaziova*), *C.*

nucifera, *C. plumosa* (G), *C. Procopiana* (*Marie-Rose*), *C. Weddelliana* (fig. 737).

Dæmonorops.—Very similar to *Calamus*, and requiring the same treatment under cultivation. They are happiest in a hot, moist house. All the species are ornamental when small, their spiny stems and rachises being



Fig. 737.—*Cocos Weddelliana*.

decidedly ornate. *D. fissus*, *D. grandis*, *D. Jenkinsianus*, *D. Lewisianus*, *D. melanochates*.

Dictyosperma.—Several Palms, commonly known as Arecas, belong here. They are natives of the Mascarene Islands, where they grow to a large size. Under cultivation they are most ornamental when about a yard high, their pinnate, graceful leaves margined with yellow or dull-red being more elegant at that size than when larger. *D. aureum*, *D. furfuraceum*, *D. rubrum*.

Diplothemium.—The Palm known as *Ceroxylon niveum* is rightly *D. caudescens*. It forms a magnificent specimen where room can be afforded, and even when small its bold, sub-erect leaves, rich black-green above, silvery beneath, are very striking. There are plants at Kew with leaves 15 feet long and 4 feet wide. It is remarkable in having the pinnæ set regularly and somewhat rigidly along the rachis from the base to the apex.

Erythea.—Two handsome California Palms which have been called Braheas are rightly Erytheas. They have stiff, fan-shaped leaves, with spinous stalks and silvery-green blades. In bright sunlight the leaves are almost white. They grow slowly, and are sufficiently hardy to thrive in a conservatory. *E. armata*, *E. edulis* (*Brahea Roezlii*).

Euterpe.—Two useful garden plants are members of this genus, viz. *E. edulis* and *E. oleracea*, the "Cabbage Palms" of South America. They have slender, erect, ringed stems, graceful, pinnate, arching leaves, and are excellent plants for an intermediate house or stove, but they do not bear rough usage as well as many Palms. They are pretty when only a foot high.

Geonoma.—A large genus of tropical American Palms of varying height and foliage, some being tall, whilst others are stemless, and the leaves of some are elegantly pinnate, whilst in others they are simply bilobed. They all require tropical conditions, and they like shade. They

are suitable for houses of ordinary size. Some of the best are *G. acaulis*, *G. baculifera*, *G. Carderi*, *G. gracilis*, *G. Pohliana*, *G. Princeps*, *G. Schottiana*, and *G. Seemannii*.

Howea.—The two Kentias, *Fosteriana* and *Belmoreana*, natives of Lord Howe's Island, are known botanically as Howeas. They are by far the most popular of all Palms, owing to their elegance from babyhood onwards, and their sturdiness, which enables them to undergo more rough treatment than any others, not even excepting the favourite "*Latania*". When full-grown they are 40 or 50 feet high, with rich-green pinnate leaves 8 to 10 feet long. Millions of the seeds are imported annually, and sold to nurserymen and market growers. They will thrive in a house where the winter temperature does not fall below 50°; they are, however, at their best under tropical conditions.

Hyophorbe.—Two species are grown in gardens as Arecas. They have thick, ringed stems and sturdy, pinnate leaves 8 feet long. Small plants have trigonous leaf-sheaths and gracefully arched leaves of a rich-green colour, with yellowish nerves. They require stove treatment. *H. amaricaulis*, *H. Verschaffeltii*.

Kentia (see under *Howea*).—The only plants to be dealt with here are *K. elegantissima* and *K. Sanderiana*, both elegant, slender, pinnate-leaved tropical Palms from



Fig. 738.—*Kentia Sanderiana*.

New Guinea. The latter (fig. 738) when young is remarkably elegant on account of the long, tapering, narrow pinnæ closely crowded together. It is one of the prettiest of Palms in a small state.

Latania (see under *Livistona*).—Three handsome tropical Palms from Mauritius constitute this genus; they have tall, unarmed stems, large, somewhat leathery, palmate leaves, devoid of spines. When young they are attractive on account of their rich glossy-green leaves, margined and lined with red or yellow. They are useful only for the ornamentation of tropical houses. *L. Commersoni* (*rubra*), *L. Loddigesii* (*glaucoophylla*), *L. Verschaffeltii* (*aurea*).

Licuala.—Several of the thirty species known are grown in gardens, the most noteworthy being *L. grandis*, the "Round-leaved Palm", which has a slender stem and broad, rounded, plaited, glossy-green leaves. *L. Jeanneceyi* is a new introduction with fan-shaped leaves, the blade being divided into numerous segments which are notched at the apex. Other species in gardens are *L. elegans* and *L. horrida*, both of which are dwarf and of

tufted habit. All the species are eastern and distinctly tropical.

Linospadix.—Two handsome Palms of recent discovery are *L. Micholitzii* and *L. Petrickiana* (fig. 739) from New Guinea. They appear to be dwarf in habit, with bold, pinnate leaves elegantly arched and of a rich deep-green; the rachis is clothed with a net-work of brown fibre. The young leaves are of a rich brown-purple colour. Both grow well under tropical treatment.

Livistona.—To this genus belong the *Latania*s and *Coryphas* of gardens. There are fourteen species, all natives of the Old World tropics, where they form large trees, with erect, ringed trunks and large crowns of palmate leaves, the stalks margined with spines. *L. chinensis* (*Latania borbonica*) is the common Fan-Palm so largely used in decorations of all kinds. It is one of the best-natured plants, thriving in a greenhouse or stove and bearing exposure wonderfully well. Seedlings should be grown on quickly in heat, as the plants do not develop into character until three or four years old. The same may be said of *L. australis* (*Corypha*), which has smaller, more rigid leaves and is perhaps slightly hardier. Other good garden Palms are *L. elata*, *L. Hoogendorpii*, *L. Jenkinsiana*, and *L. rotundifolia*.

Martinezia.—A South American genus, one species of which, *M. caryotafolia*, is worth a place among garden Palms on account of the distinctness, elegance, and bright-green character of its leaves. Fully developed it has a slender trunk 20 to 30 feet high, clothed with rings of blackish spines and bearing a crown of pinnate leaves 5 feet long, the pinnæ exceptionally broad, lobed, and truncate, as in *Caryota*. It requires stove treatment.

Penanga.—Slender Palms, some of them dwarf and tufted. They are natives of tropical regions, and require stove treatment. Several are grown for their mottled leaves, but they are not suited for any except choice collections. *P. decora* (leaves reddish), *P. disticha*, *P. patula*, *P. Sanderiana* (leaves green, mottled red), *P. Veitchii* (leaves mottled).

Phoenix.—Comprises about a dozen species of Old World Palms, varying in height from a few feet to large trees. They are all ornamental in a young state, and as they stand rough treatment well, several are grown in large quantities for furnishing purposes. In the south of France they are grown in trenches outside and kept very moist, treatment which causes them to grow quickly into well-furnished bushes; they are then lifted and planted in small tubs, to be used in northern towns. They are very handsome when of large size. Some of them will thrive in a cold conservatory. *P. canariensis* (G), *P. dactylifera*, the Date-Palm (G), *P. humilis* (G), *P. reclinata* (G), *P. Roebelini*, *P. rupicola*, *P. spinosa*, *P. sylvestris*.

Pritchardia.—Large trees from the Pacific Islands, remarkable for their pale-green palmate leaves, which on fully-developed specimens are of enormous size. Young plants are attractive in their bold character, but they are easily injured owing to their being somewhat succulent. They require tropical treatment. There are some noble specimens in the great Palm stove at Kew. *P. aurea*, *P. macrocarpa*, *P. pacifica*, *P. Thurstoni*. (*P. grandis* of gardens is a *Licuala*.)

Ptychoraphis.—Three species of this elegant Malayan genus have recently found favour in English gardens because of their graceful habit and pinnate leaves, in which respect they rival *Cocos Weddelliana* and *Geonoma gracilis*. They require tropical conditions, but they grow quickly from seeds into elegant little plants which may be used for the decoration of dinner-tables, &c., as they bear such

treatment well. *P. augusta*, *P. Sanderiana*, *P. singaporenensis*.

Ptychosperma.—*P. Alexandræ* is an Archontophœnix. Some of the plants included here in Ptychoraphis have

leaf-stalks and the brown, netted fibre which envelopes the stem. They grow rather slowly when young. They require tropical treatment. No Palms are better adapted for the decoration of large, warm houses. They are all native of Tropical America and the West Indies. *T. argentea*, *T. barbadensis*, *T. excelsa*, *T. Morrisii*, *T. parviflora*, *T. pumilio*, *T. radiata*.

Trachycarpus.—Not a particularly euphonious name for one of the commonest and most useful of Palms, known to most people as *Chamærops Fortunei*, the Chusan Palm, the only truly hardy Palm in this country. At Kew there are specimens on the lawns, where they have been many years, winter and summer, without protection. There are also two very large examples, 45 feet high, in the temperate house, and these are interesting as being two of the first batch sent home from China by Fortune in 1845. Another of the same age is on the lawn in front of the drawing-room window at Osborne. Plants intended for planting permanently out-of-doors should be grown in a cool house for a few years. *T. excelsa* (*Chamærops Fortunei*, *C. excelsa*).

Versaffeltia splendida.—Another noble Palm from Mauritius, where, growing among the rocks, it towers up to a height of 80 feet, its trunk a foot in diameter and raised as it were on stout roots. Young plants show the

also been called Ptychospermas in gardens. None of the true plants of this genus have any particular value as garden plants.

Rhapis.—Two of the most useful Palms are *R. humilis* and *R. flabelliformis*, both natives of China, where they form Bamboo-like clusters of slender stems clothed with small palmate leaves, which in *R. humilis* have the segments gracefully arched and attenuated, whilst in the other they are stiffer and less elegant. Both thrive under greenhouse conditions, and when quite small they are serviceable as table plants; they bear rough usage very well.

Rhopalostylis.—The pinnate-leaved Palms known in gardens as *Kentia* or *Arcea Baueri* and *sapida* belong to this genus; the former is a native of Norfolk Island, the latter of New Zealand. They are excellent for a large conservatory, where they may be planted out or grown in large tubs. When small they are less elegant than the Howeas (*Kentias*), but they may be grown under cooler treatment than these will support. *R. sapida* has narrower leaflets than the other.

Roscheria melanochætes is a handsome tropical Palm from the Mascarene Islands, where it forms a slender tree 20 feet high, with large, spiny, flabellate leaves. It is sometimes grown as a specimen plant in a tropical house, but it is somewhat difficult to keep in condition.

Seaforthia.—See *Archontophœnix Cunninghamii*.

Stevensonsonia grandifolia is remarkable for its large leaves mottled with red-brown, and also for the long spines which thickly clothe the leaf-stalks. There is a plant of it 20 feet high in the great Palm house at Kew. It is a native of the Seychelles, where it forms a stem 50 feet high and a foot in diameter. In some gardens it still bears the name of *Phœnicophorum seychellarum*. It requires plenty of heat and moisture.

Thrinax.—All the species are elegant when young, and when fully developed they have few equals for gracefulness. Some of them grow to a height of 40 feet, whilst others, *T. Morrisii* and *T. pumilio* for instance, do not exceed a yard in height. They are easily distinguished from all other fan-leaved Palms by their slender, unarmed

same peculiarity; they have large bilobed leaves, bright-green with reddish stalks and black needle-like spines. It grows freely under moist tropical conditions, and is one of the most striking of Palms at any age.

Wallichia.—Dwarf tufted Palms, with long pinnate



Fig. 739.—*Linnospadix Petrickiana*.



Fig. 740.—*Wallichia caryotoides*.

leaves, cuneate at the base, the apex jagged. They do best when planted in a border in a tropical house, where they form noble masses, suggesting gigantic Ferns. They develop large horse-tail-like bunches of flowers. *W. caryotoides* (fig. 740), *W. densiflora*.

Washingtonia filifera (Pritchardia) is a noble Palm from California, and now naturalized in various subtropical regions. It is one of the most effective of Palms for a conservatory or cool house. The large bright-green palmate leaves are ornamented with long thread-like filaments. When young the plants should be kept under tropical conditions to induce them to develop quickly. They are somewhat thin for the first two or three years. Sometimes called *W. robusta* and *Brahea filamentosa*.

CYCADS.

The Cycads are entitled to a place among garden plants for other reasons than that of ornament. They are the only survivors of an otherwise extinct vegetation, their existence among the living forms of plants being as

are the *Zamias*, some of which are only a few inches high. Generally they have thick stems bearing broad crowns of pinnate, sometimes spinous, leaves, radiating from the centre like a tree-Fern. The cones, usually large, are developed from the centre of this crown. They are invariably dioecious, that is, male and female cones on separate plants. The Australian genus *Bowenia* has a fleshy irregular root-stock and elegant bipinnate leaves 3 to 5 feet high. When well grown this is a handsome stove-plant. *Stangeria*, from South Africa, has a short fleshy stem and leaves so similar to those of some *Lomarias* that a German botanist named it *Lomaria eriopus*. It first produced a cone at Kew about fifty years ago, when its relationship to *Cycas* was at once revealed.

As decorative plants Cycads are more in favour in Belgium, France, and Russia than in England; and yet there are no nobler plants to be seen in the great Palm stove at Kew than the grand specimens of *Encephalartos*, *Cycas*, *Macrozamia*, *Ceratozamia*, and *Dioon* (see plate). Many of them are ornamental when small, and some, *Cycas revoluta* for example, do not readily succumb to even the roughest treatment.

Another remarkable character in Cycads is that of the exceptional vitality in their stems, the tops of which may be cut off and treated as cuttings, whilst the beheaded trunk may be kept to supply stock by means of lateral

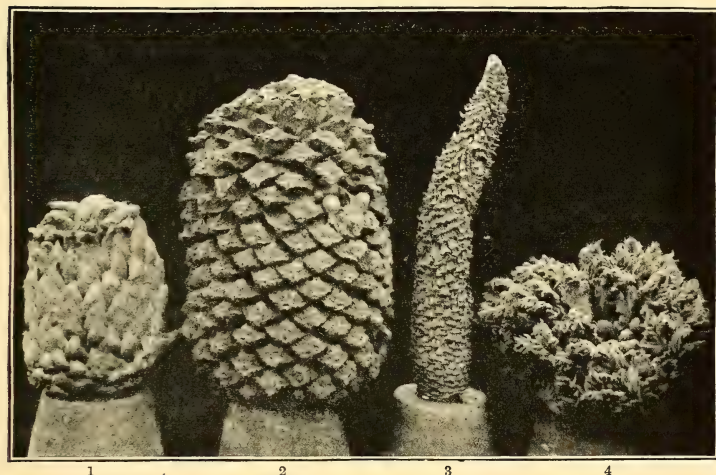


Fig. 741.—Cones of Cycads.

1, *Dioon edule*. 2, *Encephalartos horridus*. 3, *Cycas revoluta* (male). 4, *Cycas revoluta* (female).

remarkable botanically as living examples of *Ichthyosaurus* and *Megatherium* would be zoologically. "On purely morphological grounds we may regard *Cycas* as probably the most primitive type among recent flowering plants . . . showing a degree of antiquity altogether exceptional for a living genus" (Dr. Scott). Although they bear some resemblance to Ferns, and are popularly supposed to be Palms, their nearest relationship is with *Coniferæ*. Except in their cones (fig. 741), however, there is no resemblance between these two orders.

The geographical distribution of Cycads is remarkable. They are most abundant in Africa, but they also occur in India, Malaya, Australia, Central America, the West Indies, Florida, China, and Japan. Some of the species of *Cycas* have stems sometimes 40 feet high, whilst the smallest

growths. *Cycas revoluta* is most prolific when thus treated, and the Japanese avail themselves of this character for the rapid increase of this species, which they grow in fields in many thousands for exportation to Europe, especially Germany and Russia, where the leaves are in great demand for wreaths, &c. Imported stems of *Macrozamia*, *Encephalartos*, and *Cycas* have been known to remain dormant for three years and then start into vigorous growth. Seeds of the commoner species are sometimes imported in quantity, and afford a ready means of stocking the country afresh. The female cones in some of the species are large, and they assume a bright yellow or red colour when mature. They develop full-sized seeds even when not fertilized, but of course these are of no value for multiplication.

The cultural requirements of Cycads are of the ordinary character. They do not require much room at the roots, but they like a rich soil, well drained, and when growing they delight in daily supplies of water, both at the root and overhead. Liquid manure may be given when the new fronds have matured, as this deepens the green colour.

Cycas revoluta and *C. circinalis* (fig. 742) retain their leaves for a number of years, but some of the species, *C. pectinata*, for instance, lose them



Fig. 742.—*Cycas circinalis*.

as a rule every year. When the fronds sicken it may be taken as an indication that the plant requires a rest, which is afforded by withholding water for a few weeks. This usually happens in winter. To start them into growth again they should be shaken out, repotted in fresh soil, placed in a warm, moist house—if plunged in a hot-bed so much the better—and watered, at first sparingly, increasing the supply as the fronds push into vigorous growth. Sometimes the stems decay at the base. They should then be renovated by cutting off the healthy upper part of the stem and planting it as a cutting. This may be done without risk, and is often advisable even for plants which do not show evidences of decay, but are nevertheless sickly. This tenacity of life in the stems of Cycads has its only parallel in the plants of one other order, viz. Cacti. The production of

the cones by Cycads sometimes results in the loss of the central bud, and all the fronds die. The stems will, however, often push out lateral growths, and fine specimens have been developed by such decapitated stems under skilful management. It may be said that if only a portion of the stem of a Cycad has life in it one need not despair of its ultimate revival. A *Macrozamia* stem, 2 feet in diameter and 10 feet high, was cut through the middle, and the top rooted in about two years, just as if it had been a Cactus.

Cycas differs from other genera in having a conspicuous midrib extending up the whole length of the pinnæ. *Stangeria*, a South African genus, also has this character, but differs very markedly from *Cycas* in all other respects.

The species available for and worthy of cultivation are:—

Bowenia.—Stem a fleshy tuber; leaves with smooth erect stalks 2 to 3 feet high, bearing a bipinnate frond-like blade 2 to 3 feet long and wide, the pinnules ovate elongate, shining-green. *B. spectabilis*, a native of North Queensland, is the only species; var. *serrulata* has toothed pinnules.

Ceratozamia.—Mexican plants with thick short trunks, bearing arching pinnate leaves, which vary in length and in the size of the leaflets with age. The largest of all, *C. Mexicana*, when full grown, has leaves 12 feet long, and leaflets 2 feet long. Where space can be afforded, this is a truly noble plant. There are several varieties of it. Other species are *C. Kusteriana*, *C. latifolia*, *C. Miqueliana*.

Cycas.—The distinguishing characters of this genus have already been mentioned. There are some twenty species known, all of them worthy of cultivation; the most popular being:—

C. circinalis is longer and coarser in the leaves than *C. revoluta*, and grows to a greater height; in Ceylon, its thick stem attains a height of 20 feet, and is sometimes branched. One of the Kew specimens is 10 feet high, and has a magnificent head of fronds 12 feet through, about eighty radiating from the top of the stem. It is known as the Sago-Palm, and is the source of a considerable quantity of sago, which is obtained from the pith of its fleshy stems.

C. pectinata from Sikkim, is rare in cultivation, but it is one of the most graceful of Cycads. A plant of it at Kew, with a stem only 1 foot high, bore about twenty nearly upright leaves, each 8 feet long, of a rich deep green, and as elegant as an ostrich plume.

C. revoluta.—The hardiest of all Cycads, and will live in an ordinary greenhouse or dwelling-room, but is most satisfactory when grown in a warm house where the whorls of leaves are produced in quick succession. Leaves used for church decoration remain perfectly fresh and green for a month, although not in water; they are also employed in decoration when dead. It lives to a great age, the stem increasing in height very slowly; one 10 feet high would probably be 100 years old. The female is commoner in cultivation than the male. A very fine male cone, 16 inches long, was developed by a plant in the Palm-house at Kew (see fig. 741,³). The female has numerous short, comb-like, brown, velvety fronds in a cluster, bearing nut-like ovules (see fig. 741,⁴).

C. siamensis is largely grown in France, due no doubt to its being abundant in Siam and Cochin China, from whence its broad-based stems are imported in quantity. It bears elegant, bright-green, feathery fronds 4 feet long, and is said to be as hardy as *C. revoluta*, but with us it thrives only in a warm house.



Fig. 743.—*Zamia Lindenii*.

Dioon.—The two species known have short, thick stems and large, stiff, flat, pinnate leaves with spinous leaflets. The cones are as large as a man's head, and the scales are encased in thick felt-like hairs (see fig. 741,¹). There are striking examples of both at Kew, the newer one, *D. pectinatum*, being much the handsomer; it is distinguished by its larger toothed leaflets. Both species come from Mexico, and require stove treatment. *D. edule*, *D. pectinatum* (*spinulosum*).

Encephalartos.—An African genus, of which the "Kaffir bread", *E. Caffr*, is the best known. All the species have thick trunks, and they live to a great age; there are examples at Kew which have been there over a hundred years. Generally the leaves are very rigid and spinous, *E. horridus* being of most forbidding aspect. Some of the species have finely-divided elegant leaves, i.e. *E. Frederici-Guilielmi*, and *E. Ghellinckii*, and some may be grown in a greenhouse, although they are happiest under tropical treatment. *E. Altensteinii*, *E. Caffr*, *E. Frederici-Guilielmi*, *E. Ghellinckii*, *E. Hildebrandtii*, *E. horridus*, *E. Lehmanni*, *E. villosus*.

Macrozamia.—The Australian representatives of the order, and several of them are perhaps the handsomest of all Cycads. It would be difficult to find nobler foliage plants than *M. Hopei* and *M. Macleayi* as represented at Kew. They all have very thick butt-like stems, and long pinnate leaves; some species, such as *M. Fraseri* and *M. plumosa*, have pinnules as narrow as in Cycas. They are all tropical. *M. flexuosa*, *M. Fraseri*, *M. Hopei*, *M. Macleayi* (*Denisoni*), *M. plumosa*, *M. spiralis*.

Stangeria paradoxa has already been described. It

forms a handsome Fern-like specimen 6 feet through. It prefers hot, moist treatment.

Zamia.—The Western genus and by far the most variable. Generally the plants are not happy under cultivation. They appear to prefer shade and moisture with a decided rest in a lower temperature, with dry treatment, for a month or two after growth. When happy they are strikingly handsome. The genus is a large one, and is well represented at Kew. The best species for ordinary collections are *Z. latifolia*, *Z. Lindenii* (fig. 743), *Z. Loddigesii*, *Z. pumila*, *Z. pygmaea*, and *Z. Skinneri*.

CHAPTER XXXVI.

SUCCULENT PLANTS.

CULTIVATION—CACTI AND THEIR TREATMENT—LIST OF SUCCULENT PLANTS.

This term is applied to certain genera and species of plants which are remarkable for their fleshy leaves or stems, a character which enables them to support the peculiar conditions under which they are found wild. Usually they are exposed for long periods to excessive sunlight and drought—"Their usual habitats are dry sandy and stony plains, waste rocky plateaux and crevices of rocks, which are almost completely wanting in soil. They inhabit regions where no rain falls for about three-fourths of the year. Most of them have in their tissue peculiar aggregates of cells which apparently serve for the storing up of water for the dry season. Succulent plants have been not inaptly compared to camels, 'the ships of the desert', which provide themselves with a large quantity of water, and are then able to dispense with further supplies for a long time without injury" (Kerner).

Under cultivation it is not necessary to withhold water from these plants except perhaps for a few weeks in winter, and some successful growers of them do not keep them dry even that time. For the greater portion of the year they may be watered as regularly as Pelargoniums or Begonias, provided they have at the same time as much sunlight as possible. They do not die if kept dry for a long period, but they are not benefited by it; on the contrary, they are often weakened.

The tender species should be grown in houses or frames where they will receive little or no shade, even in very sunny weather. Many of them may be placed in the open air from June to the end of September: they all enjoy plenty of air. Their power to endure drought without suffering fits them for gardens or positions where daily attention cannot be afforded. The most

successful grower of these plants, however, is he who affords them every attention, never allowing them to shrivel or to be checked in growth for want of water, or to suffer in other ways. In a wild state the conditions during the short period when they can make new growth, and lay in a fresh store of moisture to enable them to withstand drought, are very different from anything we can provide. The rains are accompanied by extreme warmth and very bright sunshine. Their leaf and stem structure is modified to enable them to bear these extreme conditions, and to make the most of them. The conditions we can supply artificially are less extreme, and the growth made by the plants is correspondingly slower. Generally it is best to keep them growing throughout the summer by supplying conditions favourable to growth, and to rest them more or less for a few weeks in winter. Further directions for their cultivation are given with each genus.

Cacti.—These form a natural order of thirteen genera and something like a thousand species, all, with one or two exceptions, natives of the New World, though some are now naturalized in some parts of the Old. They are most abundant in Mexico and in some parts of South America. They present considerable variety of form and stature, some forming columns 50 feet high, whilst others are small cushion-like tufts. Many of them are attractive on account of the strange fantastic shape of their stems, their spines, and more especially their generally large handsome flowers, often richly coloured and deliciously fragrant. Those species which expand their large flowers only at night are particularly interesting. As a rule they are easily kept in health, an ordinary greenhouse affording conditions suitable for many of them, if the light and air are good. In damp, dull weather they are apt to lose their roots and even the base of the stem, but they strike root again readily if all the decayed portions are removed and the healthy remainder be placed on dry soil until it has callused and started to root, when water may be given. They grow well when planted in a shallow bed of light loamy soil in a sunny frame or low house. The best position for them would be a rockery under glass facing south, and with sufficient hot-water pipes to ensure a temperature of 50° during cold weather.

Some species are sufficiently hardy to live permanently out-of-doors in the warmer parts of the British Isles. They require a sunny

sheltered position, and should be planted in a mixture of brick-rubble and loam on a well-drained subsoil. A rockery against a south wall is an ideal position for them, and if a few lights can be fixed over them, to keep off excessive moisture in winter, they are much safer.



Fig. 744.—Group of Mexican Cacti.

The collection of hardy Cacti at Kew is planted in the recesses formed by the buttresses of the Palm-house, where large groups of the following are grown on the south-west side of the house. The border is raised by means of loam and pieces of sandstone, over which the plants in most cases have formed a thick interlacing growth, having been planted there now over four years. In severe weather a garden mat is thrown over them. So far as temperature is concerned, it is never so cold in any part of England as in the haunts of these plants in the Rocky Mountains of Colorado, &c., where 40° to 50° of frost are not unusual, and at a time when the plants are bare of snow. Probably the alternations of cold and wet, frosty and muggy weather experienced in our climate prove fatal to these plants. A sunny unheated frame, with detachable lights, would be the best of all situations for them.

The following are hardy:—*Cereus Engelmanni*, *C. Fendleri*, *C. gonacanthus*, *C. Phœniceus*, *C. viridiflorus*, *Echinocactus glaucus*, *E. Pentlandi*, *E. Simpsoni*, *Mamillaria missouriensis*, *M. Nuttallii*, *M. Purpusi*, *M. Spæthiana*, *M. vivipara*, *Opuntia bi-*

color, *O. Engelmanni*, *O. fragilis* (*brachyarthra* is a variety of this), *O. humilis*, *O. Picolominiana*, *O. polyacantha* (*missouriensis*), *O. Rafinesquii*, *O. rhodantha*, *O. vulgaris*, *O. xanthostema*.

Selection of the most useful and best-known Succulent Plants:—

Agave (fig. 745).—An extensive genus, chiefly Mexican, containing many very ornamental plants adapted for conservatory and outdoor decoration, and also for terraces. The old American Aloe (*A. americana*) is well known, and

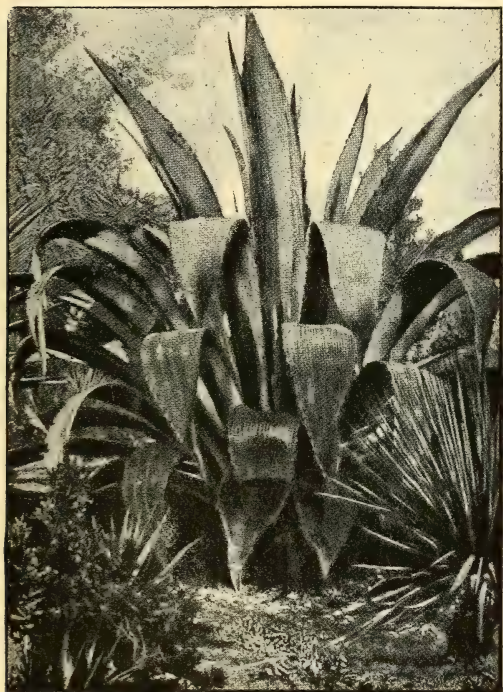


Fig. 745.—Agave.

its varieties, *variegata* and *medio-picta*, should be amongst the first for large houses. They contrast well with, and retain their individuality in, the vicinity of masonry and statuary. All Agaves require to be kept moderately dry and safe from frost during winter. The best soil is loam, sand, and rotten manure. Large plants should be repotted in May, when the old roots can be cut entirely away, and the plant merely set on the new soil, when it will soon make new roots.

Most of the species flower once and then perish. Under cultivation, especially in pots, they take many years to arrive at the flowering stage. A few flower almost annually. Some, such as *A. americana*, send up tall, pole-like spikes 20 to 30 feet high.

The best large sorts, with rosettes of leaves from 6 to 15 feet wide and 4 to 8 feet high, are:—*A. americana* *medio-picta*, *A. americana* *variegata*, *A. atrovirens*, *A. attenuata*, *A. Hookeri*, *A. horrida*, *A. macracantha*, *A. miradorenensis*, *A. potatorum*, *A. rigida*, and *A. striata*.

Medium-sized plants, of 2 to 4 feet spread, and 2 to 3 feet high:—*A. applanata*, *A. dasyliroides*, *A. filifera*, *A. Ghiesbreghtii*, *A. hystrix*, *A. lurida*, *A. schidigeru*, *A. Sisalana*, and *A. Verschaffeltii*.

Small compact plants, of from 1 to 2 feet spread, and

1 to 2 feet high; dense-growing:—*A. albicans*, *A. Beaucarnei*, *A. Bessereriana*, *A. geminiflora*, *A. mitis*, *A. Richardsii*, *A. Scolymus*, *A. striata*, *A. Victoriae reginae*, and *A. Wislizeni*.

Aloe.—African plants, some of the arborescent forms of which are ornamental both in leaf and flower. They should be grown in pots in sandy loam. *A. ciliaris* is a useful greenhouse climber. Most of the species have showy flowers, produced in autumn and winter. The old partridge-breast Aloe, *A. variegata*, is often seen better grown in a cottage window than in a conservatory, because in the former case it is kept for a long time in the same pot, which all Aloes like. Some of the smaller species have prettily mottled or striped foliage, and their flowers, produced on slender, often branching, spikes, are always attractive.

The best for large houses are the following; they grow from 6 to 15 feet high, with a spread of foliage of 3 to 5 feet:—*A. abyssinica*, *A. africana*, *A. arborescens*, *A. Bainesii*, *A. caesia*, *A. ferox*, and *A. supralævis*. When they get too high the top can be cut off at whatever height may be chosen, and put into dry soil, in which, if kept quite dry, it will soon root. This should be done in spring.

Medium-sized, height 2 to 5 feet:—*A. albocincta*, *A. Cooperi*, *A. grandidentata*, *A. Greenii*, *A. lineata*, *A. Lynchii*, *A. mitraformis*, *A. saponaria*, *A. soccotrina*, *A. spinulosa*, *A. striata*, *A. tricolor*, and *A. vulgaris*.

Dwarf, height 6 to 20 inches:—*A. humilis*, *A. prolifera*, *A. Rebuti*, *A. serra*, *A. serrulata*, *A. somaliensis*, and *A. variegata*.

The following do very well in the open air in summer:—*A. arborescens*, *A. fruticosa*, *A. serra*, and *A. vulgaris*.

Cereus.—A large and important genus of Cacti, the species of which may be divided into three groups, namely, climbers, tall erect growers, and moderate-sized erect growers. The climbers produce the largest flowers, and generally require a stove to bring them to perfection. In large conservatories a group of the tall species on a raised position has a good effect. The flowers nearly always open in the evening, and close the next day.

Climbers:—*C. fulgidus*, *C. grandiflorus*, *C. Lemairii*, *C. MacDonaldii*, *C. Napoleonis*, *C. nycticalus*, and *C. triangularis*.

Thin-stemmed or trailers; good for baskets:—*C. Berlandieri*, *C. Blankii*, *C. flagelliformis*, *C. Mallisoni*, and *C. procumbens*.

Tall erect growers, 10 to 40 feet high:—*C. geometrizans*, *C. giganteus*, *C. glaucus*, *C. Jamacaru*, *C. lividus*, *C. nobilis*, *C. peruvianus*, and *C. Sargentianus*.

Moderate erect growers, 3 to 10 feet high:—*C. chilensis*, *C. eburneus*, *C. euphorbioides*, *C. gladius*, *C. multangularis*, *C. repandus*, and *C. strigosus*.

Dwarf species, less than a foot high:—*C. cæspitosus*, *C. ctenoides*, *C. enneacanthus*, *C. Lecanus*, *C. multiplex*, and *C. polyacanthus*.

Cotyledon, including *Echeveria*.—Crassulaceous plants from the Cape of Good Hope. They are grown chiefly for bedding purposes. Some of them are worth growing in pots for the conservatory. The best of these are:—*C. agavoides* (*Corderoyi*), *C. dasyphylla*, *C. gibbiflora*, *C. metallica*, *C. orbiculata*, *C. ovata*, *C. Pachyphyton*, *C. pulverulenta*, and *C. secunda*. (Fig. 746.)

Crassula.—Not many plants of this large genus are grown in gardens. A few are useful and ornamental for winter flowering in conservatories. They all grow very easily in a mixture of sandy loam and leaf-soil, and increase by cuttings freely.

Large plants, free flowering:—*C. abyssinica*, *C. falcata*, *C. lactea*, and *C. pallida*. (Fig. 747.)

Small or tufted species:—*C. columnaris*, *C. Cooperi*, *C.*

about 1 foot long, varying from white to deep rose, very effective, and produced freely. The plants will stand rougher treatment than most Cacti, and are moderately hardy, growing well in the open ground in summer. They produce offsets freely, which should be removed early if large plants are required.

E. cristata, *E. Decaisneana*, *E. Duvalii*, *E. Eyriesii*, *E. multiplex*, *E. oxygona*, *E. rosea*, *E. tubiflora*, *E. valida*, and *E. Zuccariniana*.

Epiphyllum.—See special article, p. 438.

Euphorbia.—A very large genus of extreme variation. Many of the African species, as well as those of other tropical countries, possess succulent, spiny, leafless stems like Cacti. They can, however, always be distinguished from Cacti by their milk-like juice, revealed by a slight pin-prick. Very few of the species have any distinctly ornamental character, but the most striking of those with succulent stems are grown along with Cacti. They require the same treatment as *Cereus*.

The best known are:—*E. abyssinica*, *E. Beaumeriana*, *E. canariensis*, *E. Caput-Meduse*, *E. cereiformis*, *E. Cooperi*, *E. globosa*, *E. grandicornis*, *E. Macouani*, *E. mamillaris*, *E. meloformis*, *E. polygona*, *E. resinifera*, *E. Sipolisii*, *E. tetragona*, and *E. virosa*. (Fig. 748.)

Furcraea (*Forcroya*).—Agave-like plants, with long, sword-shaped, usually spine-clad leaves, which are valuable as a source of fibre (Mauritius hemp, &c.). The green-leaved species are as ornamental as Agaves, such as *A. rigida*, and two sorts, viz.

hemisphaerica, *C. impressa*, *C. perfoliata*, *C. pyramidalis*, and *C. Septas*.

Echeveria.—See *Cotyledon*.

Echinocactus.—A large genus of Cacti, with short, usually thick stems, a few only growing to a height of over 3 feet. They rarely branch, but the stem is conspicuously furrowed and clothed with bundles of large, often hooked, rigid spines of forbidding aspect. Their large handsome flowers open only when the sun is shining upon them. The majority require warm greenhouse treatment. They prefer a sandy loam, mixed with sand and broken brick. They should be examined in spring, to see that the roots are good, as the plants may look healthy when the roots are gone. If rotten at the base, cut off the decayed part and expose the plant on a shelf until roots are emitted. Imported plants and cuttings should be treated in the same way. Some of the slow-growing sorts form plants quickest if grafted on some free-growing *Cereus*, such as *C. peruvianus* or *C. tortuosus*. April and May are the best months for grafting.

The most interesting of the large kinds are the following:—*E. cornigerus*, *E. cylindraceus*, *E. echidne*, *E. electracanthus*, *E. Emoryi*, *E. Pfeifferi*, *E. platyceras*, *E. Pottsi*, *E. Visnaga*, and *E. Wislizeni*.

The following are of smaller growth:—*E. bicolor*, *E. breviamatus*, *E. cinnabarinus*, *E. concinnus*, *E. corynodes*, *E. crispatus*, *E. Cumingii*, *E. denudatus*, *E. hexadrophorus*, *E. longiamatus*, *E. Mirbelii*, *E. Monvillei*, *E. multiflorus*, *E. myriostigma*, *E. Scopa*, *E. Simpsoni* (said to be hardy in England), and *E. tortuosus*.

Echinocereus.—Included in *Cereus*.

Echinopsis.—A genus of about twenty species, the stems of which are only a few inches high, and shaped like an Orange or a Pear, and their flowers are generally



Fig. 746.—Cotyledons.

1, agavoides. 2, secunda. 3, metallica. 4, ovata. 5, Pachyphyton. 6, gibbiflora.



Fig. 747.—Crassulas. 1, pallida. 2, falcata.

F. Lindenii and *F. Watsoniana*, are attractively variegated. In habit and in flower-spike they closely resemble Agaves. They like warm greenhouse treatment, but may be placed in the open air along with Agaves in summer.

F. cubensis, *F. elegans*, *F. geminispina*, *F. gigantea*, *F. Lindeni*, *F. longeva*, *F. macrophylla*, and *F. undulata*.

Gasteria.—Dwarf Aloe-like plants, all natives of South Africa. They have rigid, usually trigonous, fleshy, unarmed leaves, mottled or covered with raised dots of gray. Their flowers are bright in colour, generally red, curved, and borne on long slender scapes, sometimes branched. They are charming plants for the

H. erecta, *H. margaritifera*, *H. papillosa*, and *H. subattenuata*.

Species with verrucose foliage with small warts:—*H. attenuata*, *H. clariperla*, *H. fasciata*, and *H. radula*.

Species with stiff, spiral, green, cuspidate foliage:—*H. bullata*, *H. congesta*, *H. foliolosa*, *H. pentagona*, and *H. spiralis*. These are more rigid than the others, and grow 6 to 12 inches high. They are not unlike a branchlet of *Araucaria imbricata*. They are sometimes placed in a separate genus, namely, *Apicra*.

Kalanchoë.—Chiefly African plants, related to *Crassula*. They are erect herbaceous shrubs with very fleshy decussate foliage, and some of them bear large corymbose heads of bright-coloured flowers. They may be grown in a greenhouse or frame if allowed plenty of sunlight. The best species, *K. flammea* (scarlet), from Somaliland, requires a tropical temperature until it has made its growth, when it should be removed for a few weeks into a greenhouse, and be kept dry. It flowers in early summer and lasts at least two months.

Other species in gardens are:—*K. carnea* (pink), *K. grandiflora* (yellow), *K. marmorata* (marbled leaves), and *K. thyrsiflora*.

Kleinia.—A Senecio-like genus, with fleshy leaves and yellow flowers. They are grown chiefly as bedding plants, some of them having gray or silvery leaves of ornamental character. They grow and flourish with the same treatment as *Crassula*, being from the same source.

K. articulata, *K. calamifolia*, *K. repens*, *K. spinulifera*, and *K. tomentosa*.

Mamillaria.—A large genus of dwarf Cacti, depending on the various colours of the spines and the geometrical arrangement of the mammi for their chief attractions. By arranging them in groups according to the colours of their spines and their size, selection of sorts will be facilitated. They all grow freely in a greenhouse, and require free watering in summer, with occasional syringing overhead to keep down insects. They will live through the winter without water. Their flowers, which are small and usually red, are developed in a zone a little below the apex of the stem.

Stems 4 to 12 inches high, white spines:—*M. angularis*, *M. bicolor*, *M. cirrhiifera*, *M. nivea*, *M. nobilis*, *M. Parkinsoni*, *M. Peacockii*, *M. senilis*.

Stems branching, 1 to 5 inches high, spines white:—*M. gracilis*, *M. polia*, *M. Schiedeana*, *M. stellaris*.

Stems dense, erect, 4 to 18 inches high, spines yellow:—*M. erecta*, *M. Odieriana*, *M. Pfeifferi*, *M. rhodantha*, *M. Schlectendalii*, *M. spinosissima*.

Stems branching, 1 to 4 inches high, spines yellow:—*M. densa*, *M. echinata*, *M. stella-aurata*, *M. Wildiana*.

Stems erect, 6 to 20 inches high, spines red:—*M. caracasana*, *M. elegans*, *M. rhodacantha*, *M. Schelhasii*, *M. verruculata*.

Stems erect, 4 to 12 inches high, dark spines:—*M. coronaria*, *M. kewensis*, *M. melaleuca*, *M. phymatothele*, *M. tetraacantha*, *M. variabilis*, *M. vetula*.

Mammi large, flowers yellow, spines brown:—*M. ele-*

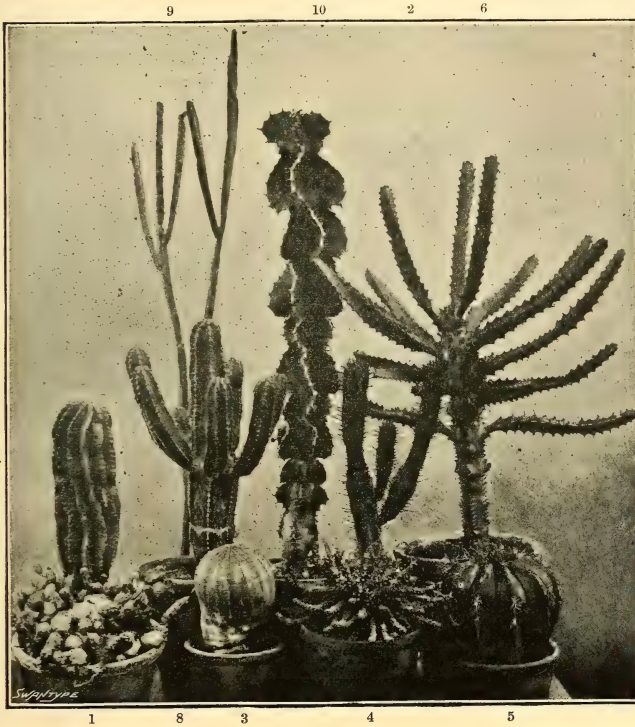


Fig. 748.—Euphorbias.

1, globosa. 2, cereiformis. 3, Macowani. 4, Caput-Meduse. 5, meloformis. 6, tetragona. 7, polygona. 8, Beaumeriana. 9, Sipolisii. 10, Cooperi.

greenhouse. If grown in bright sunshine the leaves are apt to scald. They flower in spring or early summer. They require little water in winter.

Species with smooth foliage and a spiral habit of growth:—*G. Bowiciana*, *G. formosa*, *G. obliqua*, and *G. spiralis*.

Species with smooth foliage and a distichous habit of growth:—*G. disticha*, *G. formosa*, *G. lingua*, and *G. nigricans*.

Species with rough foliage and a spiral habit of growth:—*G. carinata*, *G. letepunctata*, *G. strigosa*, and *G. undata*.

Species with rough foliage and a distichous habit of growth:—*G. brevifolia*, *G. intermedia*, and *G. verrucosa*.

Haworthia.—Dwarf Aloe-like South African plants, remarkable for the raised white pearl-like markings on the leaves of many of the species, which have obtained for them the name of Pearl Aloes. They require shade in summer and not over-drying in winter.

Species with smooth, foliage and fringed margins:—*H. arachnoidea*, *H. Bolusii*, *H. setata*, and *H. translucens*.

Species with smooth, plain foliage:—*H. cuspidata*, *H. parva*, *H. planifolia*, *H. retusa*, *H. tessellata*, and *H. turgida*.

Species with verrucose foliage with large warts:—

phantidens, *M. gigantothele*, *M. longinamma*, *M. pycnantha*, *M. sulcolonata*, *M. Winklerii*.

Mesembryanthemum.—An extensive and very varied genus of Cape plants, within whose limits there are plants for the florist, for the amateur who loves plants for structural beauty or singularity, and for those who desire only useful bedding plants. With the exception of the dwarf, fat-leaved sorts, they all grow and strike freely in a mixture of loam and leaf-mould with a dash of sand. The flowering kinds should be kept only two or three years, as the old plants do not grow or flower

so freely as younger ones. Cuttings should be put in about May. The plants, if dry, will stand a few degrees of frost.

The best species for the sunny greenhouse, vases, or window-boxes are:—*M. barbatum*, *M. blandum*, *M. Brownii*, *M. candens*, *M. conspicuum*, *M. curviflorum*, *M. emarginale*, *M. falcatum*, *M. formosum*, *M. glaucum*, *M. imbricans*, *M. polyanthum*, *M. reflexum*, *M. retroflexum*, *M. roseum*, *M. spectabile*. These can be used for bedding purposes very well, as those that require it can be pegged down.



Fig. 749.—*Sempervivums*.

1, *cucare*. 2, *holochrysum*. 3, *canariense*. 4, *arboreum*. 5, *urbicum*.

Fleshy-leaved species, which have a fascination for the lover of uncommon types of vegetation:—*M. agninum*, *M. albidum*, *M. Bolusi*, *M. caninum*, *M. densum*, *M. dolabriforme*, *M. felinum*, *M. fissum*, *M. linguaeforme*, *M. minimum*, *M. murinum*, *M. obovatum*, *M. octophyllum*, *M. tigrinum*, and *M. vulpinum*. These are dwarf-growers, and require more sand and some brick rubbish in the soil, with less moisture.

Opuntia.—The Prickly Pear or Indian Fig. A large genus which as a rule is characterized by broad, flattened stems, suggestive of battledores. They vary in size and habit, some being tree-like, with woody stems, whilst others trail on the ground. Some species have cylindrical stems. Many are clothed with long barbed spines, and are used as fences in tropical countries. Their flowers are usually tawny-yellow. The fruit of some are edible. The vitality of the stems is exceptional, small pieces rooting quickly and soon forming large plants. A few well-marked kinds have a pleasing effect among plants of ordinary appearance. The best are: *O. basilaris*, *O. clavarioides*, *O. corrugata*, *O. decumana*, *O. elatior*, *O. Engelmanni*, *O. exuvata*, *O. Ficus indica*, *O. horrida*, *O. maxima*, *O. microdasys*, *O. monacantha*, and *O. senilis*.

Phyllocactus.—See special article, p. 488.

Pilocereus.—The old man Cactus, *P. senilis*, has long hairs produced freely from the apex of the stem, and is very striking. They do not grow so fast as *Cereus*, and seldom flower. It is a curious fact that no insects infest them. They are slow growers, and require little water.

P. fossilatus, *P. glaucescens*, *P. Hoppenstedtii*, *P. jubatus*, and *P. senilis*.

Rhipsalis.—A tropical genus of Cacti. Some have leafless whip-like branches which bear white berries suggesting Mistletoe, others have flattened branches as in *Epiphyllum*; a few of the latter are worth growing for their flowers. They grow as epiphytes in the forests of Brazil and the West Indies, and are interesting to those who like curious plants. *R. Cassytha*, *R. funalis*, *R. Houletianus*, *R. mesembryanthoides*, *R. pachyptera*, *R. Saglionis*, and *R. salicornioides*.

Rochea.—Greenhouse plants related to *Crassula*. The best known and one of the most decorative of the whole order is *R. coccinea* (also known as a *Crassula* and *Kalosanthes*), which has erect stems clothed with sheathing decussate leaves, and bearing in summer large corymbose heads of scarlet flowers. This and *R. jasminea* have been crossed, and their progeny are pretty free-flowering plants of varying flower-colour from white to rose-red. They strike freely from leaves or cuttings put in in spring. *R. coccinea*, *R. jasminea*, *R. versicolor*. (The plant sometimes called *R. falcata* is a *Crassula*.)

Sempervivum.—The greenhouse or Canary Island group of this large family is easily grown in any soil. They form tall handsome plants if grown in a sunny greenhouse, and produce large pyramidal spikes of yellow or gray-white flowers. They are also good plants for sub-tropical bedding purposes, and are easily propagated either by seed or cuttings.

Large growers, spreading from 10 to 20 inches:—*S. arboreum*, *S. aureum*, *S. canariense*, *S. cucare*, *S. cuneatum*, *S. dorame*, *S. holochrysum*, *S. urbicum*, *S. velutinum*. (Fig. 749.)

Dwarf growers, spreading from 4 to 10 inches:—*S. aureum*, *S. balsamiferum*, *S. Hawthorii*, *S. pavie*, and *S. tabulaforme*.

Stapelia.—Toad-flower, or Carrion plant. A large genus of greenhouse plants, of great interest on account of their floral structure and the peculiarities of their growth. They grow freely on an exposed shelf, requiring but little water in winter, but to be freely supplied when growing in summer. They have been divided into several genera; but as the distinctions are only in structural development, not in diversity of shape, we retain them all under *Stapelia*. They illustrate the fact that instinct is not reason, in that the flies deposit their ova on the flowers when open, mistaking them for flesh, the result being the frustration of the design of the fly—the development of the ova—to the advantage of the plant, the fly becoming an agent in impregnating the flowers.

The best-known species are *S. Bayfieldii*, *S. Bufonia*, *S. campanulata*, *S. europea*, *S. gigantea*, *S. glauca*, *S. hirsuta*, *S. maculosa*, *S. patula*, *S. planiflora*, *S. Plantii*, *S. radiata*, *S. Thuretii*, *S. variabilis*, *S. variegata*.

CHAPTER XXXVII.

HARDY SHRUBS FOR FORCING.

Large numbers of hardy shrubs are now grown solely for forcing, either for the supply of cut flowers or to be used as plants in flower for furnishing conservatories, or for the decoration of halls and large rooms. The gorgeous flowers of the Tree Pæonies; Lilac, in variety of colour, and always fragrant; Roses, doubly valuable in early spring, when their flowers are so delicate in colour and in perfume; the double Peach; Pyrus and Thorn; Rhododendrons, both evergreen and deciduous, fill conservatory or room with interest and beauty during winter's dull days.

Though shrubs for forcing can be purchased at a reasonable rate, it is more economical to set aside a piece of ground for their culture, and work up a supply of plants at home. In this way healthy young plants would be at hand to replace exhausted ones, which could be rejuvenated by giving them a rest of a year or two in the nursery. In addition to ground for purposes of planting, a plunging-ground is essential, for although some shrubs require planting-out every other year, there are others that must always be grown in pots.

To obtain good, well-ripened wood, the ground selected for the nursery should be exposed to full sun. For the majority a rich medium loam will be found most suitable, add-

ing peat and leaf-mould for Ericaceous plants. It is preferable to raise plants from cuttings, seeds, or grafts, and grow them for two years without flowering. This time should be spent in laying a good foundation for the future plant; consequently all weak, useless wood should be removed, so that the whole strength may go to permanent parts, and the maximum amount of sun and air be admitted to the whole. At three years of age most shrubs are in first-rate condition for forcing. Those grown in borders should be lifted in October, potted, and plunged in ashes or light soil until required for use.

If the cultivator has ample means at his disposal, such shrubs as Lilac, *Staphylea*, and a few Rhododendrons may be had in flower at Christmas, if given special treatment during summer and while being forced. February, March, and April are the three months at which the forced shrubs generally are at their best, and for this they do not require excessive heat. As a rule it is better to place shrubs in a temperature not exceeding 50° for the first fortnight, afterwards raising it to 60° or more with sun-heat as the buds begin to swell. Much greater heat than this can be used, but it is better to take a week or two longer with a lower temperature than to use great heat. The plants are then not so much exhausted; they also develop healthy foliage with the flowers, which is better than when leaves are absent. A moist atmosphere must be kept in the forcing-house, and the plants be well syringed several times daily. As flowers begin to open, the plants should be removed to a cool house. To get plants into flower for the earlier dates from four to six weeks are required; for March and April from two to four weeks. Any that require special treatment are dealt with separately.

After the flowers are over the plants must be pruned, cutting out all weak, worthless, and old flowering wood to encourage a strong new growth. Throughout the summer weak, useless shoots should be taken out. Plants that have been forced should be placed in a cool house until all danger of frost is gone, kept growing, and given abundance of air. Towards the middle of May those that require a year's rest should be planted in the nursery, others that may be used for another season being plunged and well fed until growth is completed.

Acer.—The suitable plants are confined principally to three species—*A. japonicum*, *A. palmatum*, and *A.*

Negundo. The great variations in form and colour of the dainty foliage of *A. palmatum* is rarely if ever equalled in any one species. *A. japonicum* has also a large number of fine-leaved forms showing great diversity of character. *A. Negundo variegata* is bright-green and milk-white when forced. All may be grown in pots, and successfully forced for a number of years in succession. Feeding is necessary when growth is active.

Amelanchier canadensis oblongifolia.—Dwarf and shrubby; flowers white, in great profusion. It may be flowered early in February, and forced two successive years, after which it should have a year in the nursery. Very little pruning is needed.

Ceanothus.—Several are valuable for their bright-blue flowers. They require to be grown in pots in rich soil and pruned hard after flowering. The protection of a cold house or frame should be given on the approach of winter. *C. divaricatus* is of thick bushy habit; *C. papillosus*, pale-blue; *C. rigidus*, 7 feet high, previous year's wood thickly clothed with deep-blue flowers; *C. Veitchianus* has a good constitution, is most floriferous, and the flowers are dark-blue.

Chimonanthus fragrans grandiflora.—Although its yellow blossoms may often be gathered from walls in January in mild weather, their fragrance and beauty are always acceptable in the conservatory.

Chionanthus virginica (the Fringe Tree) has loose drooping panicles of pure-white flowers by Easter if not forced too hard.

Choisya ternata may be had in flower at Christmas, when its bright glossy leaves and numerous fragrant white flowers are serviceable.

Clematis.—A selection of the best garden varieties should be grown in pots, to flower from the middle of February onwards for several months. One-year-old plants twisted round sticks, and placed in an intermediate temperature in January, will produce from twelve to twenty flowers each in six weeks' time, every flower 3 inches across. For directions for the cultivation of specimens see p. 426.

Corylopsis.—The catkin-like inflorescences of *C. pauciflora*, primrose-yellow, and *C. spicata*, yellow with conspicuous red anthers, may be had in February. Both are twiggy bushes which require no other pruning than an occasional thinning.

Cratægus.—Red and white Hawthorns, double and single, are easily forced, and make charming decorative plants. Though it is possible to force specimens of considerable dimensions, the neatest and most suitable are those grown as bushes from 3 to 4 feet high. During summer the shoots must be pinched back to form spurs from which the flowers are produced. They may be flowered in the same pots for several years, but require an occasional rest in the nursery. All useless shoots should be removed to prevent the plant from becoming a thicket.

Cytisus.—Favourites for forcing. If bush plants are required they should always be on their own roots; standard specimens are worked on the Laburnum, but they require frequent renewal. After flowering they must be cut hard back, or they soon get leggy. The most useful are:—*C. biflorus*, pale-yellow; *C. kevensis*, creamy-white; *C. purpureus*, purple; *C. scoparius*, var. *Andreanus*, golden-yellow and maroon.

Daphne.—The fragrant flowers of several species may be had in December, January, and February with little forcing. Alternate years in the nursery is necessary. *D. Cneorum* has heads 1 inch across of small red flowers on every shoot; *D. Dauphini* has fragrant white flowers,

shaded purple; *D. Mezereum* has flowers either deep-red, pink, or white, and is sweetly scented.

Deutzia (fig. 750).—Excellent forcers. If subjected to excessive heat they require a rest every alternate year; moderately forced they last three successive years. *D. corymbiflora*, flowers in large corymbs; *D. crenata*, flowers in racemes 6 inches long; *D. gracilis*, most floriferous, and



Fig. 750.—*Deutzia Lemoinei*.

very useful either as plants or for cutting; *D. Lemoinei* (*gracilis* × *parviflora*) is as free as *D. gracilis*, with the large upright panicles of *D. parviflora*—preferred by some to *D. gracilis* for forcing.

Diervilla.—Several of these, such as the forms of *florida* and *hortensis*, are worth a place among shrubs that are lifted from the open ground annually and given a little warmth under glass for spring flowering.

Erica.—Several hardy species may be forced. They should be potted up in September, and plunged in a cold frame until December, when they may be removed to the greenhouse. The flowers last two to three months. The best are:—*E. australis*, rosy-purple; *E. carnea* and its white variety; *E. lusitanica*, tall, white; and *E. mediterranea hybrida*, very free, 6 to 9 inches high.

Forsythia *suspensa* is very free, and forces well if placed in a greenhouse. It should be hard pruned after flowering.

Hibiscus syriacus, in its numerous single and double forms, may be successfully forced in a medium temperature.

Hydrangea Hortensia and *H. paniculata* are most useful, and are largely grown. The usual method of culture for the former is to put in cuttings in early autumn of strong half-ripe points. When rooted they are exposed to full sun and thoroughly ripened. During early winter they must be kept dry and cool. In January report them

into 5-inch pots, and place them in heat as required. *H. Mariesii* has extra large, rose-coloured, sterile flowers and blue fertile ones; *H. paniculata hortensis (grandiflora)* is more difficult to manage. Strong plants in pots should be pruned to within three eyes of the base and stood in an intermediate temperature. In three weeks they may be given the temperature of a stove. The weakest new shoots should be removed, leaving one only to each branch. They should be well syringed and fed until the flowers open. Although they may be forced in strong heat, more satisfactory results are obtained by cooler treatment, heads of flowers 1 foot long being thus obtained. They may be rested in alternate years.

Hypericum Moserianum and *H. patulum* are useful when not overforced in strong heat and if started not earlier than March.

Itea virginica, when forced slowly so that the leaves develop with the flowers, is a pretty plant. The flowers are white, in upright racemes 3 inches long, and they open early in March, lasting for several weeks.

Jasminum nudiflorum is always acceptable in mid-winter. It flowers freely if placed in a greenhouse in December.

Kalmia angustifolia, rose; *K. glauca*, rosy-purple; and *K. latifolia*, pinkish-white, force nicely if brought on gently, to flower in April. They should be well established in pots.

Kerria japonica is an easily managed shrub, bearing orange-yellow flowers in February if started in January; the double variety lasts longer than the single. May be grown and forced in the same pots with liberal feeding three years in succession. All old flowering wood should be removed as soon as the flowers are over. After the third year it is better to throw the plants away and begin again with young ones.

Laburnum is a charming plant when forced for the conservatory. The plants should be potted in spring to force the following year.

Laurustinus. See *Viburnum Tinus*.

Lonicera fragrantissima and *L. Standishii* have small white, very fragrant flowers, and are acceptable in mid-winter. No special forcing is necessary.

Magnolia.—Plants lifted from the open ground with care and planted in pots may be had in flower in early spring. The best forciers are *M. conspicua*, "the Yulan", and the several hybrids between it and *M. obovata*, particularly *M. Soulangeana* and *M. Alexandrina*. The purple-flowered *M. obovata* and the pure-white *M. stellata* are excellent when forced. The flowers of the latter are glistening white, star-like, and so abundantly produced that they completely hide the plant.

Olearia stellulata has pretty star-shaped white flowers, and is an admirable plant for forcing. If kept in pots and not subjected to excessive heat it may be used several years in succession.

Pæonia Moutan, the Tree Pæony, is an excellent plant for forcing if grown in pots and well established before being subjected to heat. There are many varieties with flowers from 4 inches to 9 inches or more across, their colour varying from white to pink, crimson, and deep-purple. They stand fairly hard forcing, and may be had in flower early in February.

Philadelphus.—The fragrant white flowers of the various Mock Oranges make them very acceptable. They should not be forced very hard. The pretty little *P. Lemoinei* should have all old flowering wood removed as soon as the flowers are over. Others require thinning rather than cutting back.

Pieris floribunda, a dwarf, compact evergreen, with upright panicles of white flowers from every growth, and *P. japonica*, with large pendulous clusters of pure-white blossoms, also an evergreen, may be got into flower in February with a month's easy forcing.

Prunus.—Some of the most beautiful, useful, and easily managed plants for forcing belong to this genus. They may be had in flower from January until they bloom outside. The double-flowered forms are most in demand, though the single ones are beautiful. The plants may either be potted up from the open border in October or be grown in pots in the same manner as fruit-trees for forcing, and may be used a number of years in succession provided they are not exhausted by excessive heat. After flowering they should be pruned hard and fed liberally to induce strong growth, placing them in full sun to thoroughly ripen the wood. Some of the best are:—*P. Pissardi*, purple leaves with white flowers; *P. Rhexii*, a double white-flowered Cherry, flowers very freely and forces well in an intermediate temperature; *P. japonica*, double white, 4 feet high, may be forced into flower soon after Christmas; *P. nana*, dwarf, with Almond-like flowers; *P. persica*, varieties with double flowers, ranging from white to deep-red; *P. Pseudo-Cerasus*, semi-double forms recently introduced from Japan, with flowers 2 inches across. One called *Watereri* has very large pinkish-white flowers; *P. serrulata*, double white, large; *P. triloba*, double, rose-coloured, on shoots 2 to 3 feet long.

Pyrus.—The following may be forced successfully:—*P. floribunda* (fig. 751), and its forms, white or rose;



Fig. 751.—*Pyrus floribunda*.

P. Maulei, dwarf, brick-red; *P. spectabilis*, semi-double; they should be grown as bushes on a dwarfing stock.

Rhododendron.—Large or small plants can be used. It is advisable to plant them out after flowering, and rest them for a year, although some will do fairly

well two years in succession. Weak inside shoots should be cut out.

For December and January the best are:—*R. Nobleanum*, bright-red, white if forced hard, can be had in flower at Christmas; *R. flavum* (*Azalea pontica*), yellow, sweetly scented; *R. præcox*, rosy-purple; *R. Rosy Bell*, dwarf, with drooping, white, rose-tinted flowers.

For February and March the best are:—*R. caucasicum album*, white; *R. Everestianum*, rosy-lilac; *R. fastuosum flore pleno*, lilac; Grand Arab, red; John Waterer, red; Limbatum, white, margined crimson; Lord John Russell, purple; Mrs. John Clutton, white; Prince Camille de Rohan, red; Sappho, white, black spots; Vesuvius, red; Boule de Nieve, Cynthia, John Walter, and Felix de Sauvage.

R. sinense (mollis).—One of the best deciduous shrubs for early forcing, and bears a high temperature well. The flowers show great variety of colour, from yellow to brick-red.

Ribes.—The most serviceable are *R. aureum*, with fragrant yellow flowers, and *R. sanguineum*, var. *atro-sanguineum*, red; both easily forced.

Robinia hispida has pretty drooping racemes of rose-coloured flowers, which may be forced early into bloom if established in pots and not put into much heat.

Roses.—Many of the varieties of Rose may be successfully forced, but they require some preparation if good specimens and fine flowers are wanted. A Rose should be three years old before it is forced; after that, if properly treated, it will last for years. They should be on their own roots, plants on the Manetti stock producing suckers freely. Cuttings of half-ripened wood, taken with a heel, and inserted in 5-inch pots filled with turfy loam and leaf-mould, plunged in bottom-heat, soon root. A frame placed on a dung bed, with 6 inches of cocoa fibre-refuse in which to plunge the pots, is a suitable place for them, if plenty of air is given daily, and as soon as they are established, the lights taken off altogether. They may be wintered in a cold frame and protected from frost. Cut them back to two eyes in January, and give no water until they begin to grow, when they should be repotted, and if the weather is favourable, plunged on the open border, giving plenty of water. All flower-buds should be picked off. In the autumn they must be again protected in a cold pit or house, pruned in January, shortening the strong shoots to three or four eyes, and plunging them out again in the open ground.

About midsummer they should be repotted in good turfy loam and cow-dung, with a little powdered brick rubbish or charcoal to keep the soil open, adding a little leaf-mould for the delicate tea-scented sorts, and again placing them in the open air; they will not require potting again until they have flowered. Some of the Teas may be allowed to flower in autumn.

The plants should be pruned according to the time at which they are required to be in bloom. For instance, plants required to bloom at Christmas should be pruned not later than the first week in October; and they must be brought very gradually on, allowing three months for them to make their growth and flower. They require to be frequently fumigated to destroy aphides, and the maggot must be diligently sought for and killed.

The following are recommended as the best sorts for forcing:—

Twenty Hybrid Perpetuals.

Anna Alexieff.
Baroness de Rothschild.
Camille Bernardin.

Captain Christy.
Caroline Testout.
Duchesse de Valambrossa.

Duke of Edinburgh.
Fisher Holmes.
General Jacqueminot.
Gustav Piganeau.
Jules Margottin.
La France.
Madame Lacharme.

Marchioness of Londonderry.
Marie Baumann.
Mrs. John Laing.
Pride of Waltham.
S. M. Rodocanachi.
Ulrich Brunner.
Victor Hugo.

Twenty Teas.

Amazone.
Anna Olivier.
Catherine Mermet.
Cleopatra.
Edith Gifford.
Ernest Metz.
Ethel Brownlow.
Etoile de Lyon.
Gloire de Dijon.
Laurette Messimy.

Madame de Watteville.
Madame Hoste.
Madame Lambard.
Marechal Neil.
Medea.
Niphetos.
Rubens.
S. A. Prince.
Souvenir d'un Ami.
The Bride.

Spiræa.—Some species force readily in an intermediate temperature to flower in February; by attention to pruning and feeding they may be used two or three successive years. The best are:—*S. arguta*, small star-shaped flowers in great profusion; *S. media*, Hawthorn-like bunches of flowers, freely produced; *S. prunifolia flore pleno*, white, long wand-like shoots; *S. Thunbergii*, small starry-white flowers in great quantity; *S. Van Houttei*, white flowers like *S. media*.

Staphylea colchica is one of the best shrubs for forcing, as it produces large panicles of pure-white flowers from Christmas onwards; should be rested on alternate years.

Syringa (Lilac) (fig. 752).—Large quantities of forced Lilac bloom may be seen in the florists' shops in winter; it is obtained from plants prepared as follows:—The best



Fig 752.—*Syringa vulgaris* (Lilac).

varieties are grafted on stocks of the common, the scion being inserted 6 inches above the ground. They are allowed to grow for two seasons, strong shoots only being allowed to remain. At the end of the second year they have from eight to twelve strong growths each. At the end of July or beginning of August, before they are re-

quired for use in the winter, each plant is root-pruned, so that it will go into a 7- or 8-inch pot. This root-pruning is also a great aid to ripening. The holes made by the

duce waxy-white flowers freely, and are valuable in the greenhouse in late spring.

[W. D.]

CHAPTER XXXVIII.

HERBACEOUS PLANTS AND BULBS FOR FORCING.

The preparation of bulbs and herbaceous plants for forcing is similar to that already described for shrubs. They must be treated in such a manner as to induce early growth and ripening the season before they are forced. This is especially the case with such plants as Carnations, Marguerites, and Mignonette, the early preparation of which, rather than excessive forcing, ensures a good supply of bloom during the winter and early spring. Deciduous herbs and bulbous plants also, if planted early, ripen earlier in the autumn, and make the best material for growing in pots. If not thoroughly ripened before being restarted they will probably prove a failure. Many plants may be placed in a shady or even a dark position, and when well started placed where they will receive all the sun and light possible.

Allium neapolitanum.—This is extensively grown for market, the large terminal clusters of white flowers being very useful. It requires little skill. Early potted bulbs may be started in an intermediate temperature, and will require little forcing to have them in flower early in the year.

Chionodoxa Lucilia.—This may be grown in pots for winter flowering, a sunny position in a cool greenhouse suiting it well. The clear-blue flowers are very effective.

Christmas Rose (*Helleborus niger*).—The variety known as *maximus* is the best for pots or for cutting. The clumps should be potted as they are taken from the ground. If the weather is mild the protection of a frame will be sufficient until the flowers begin to throw up, when they may be removed to a warm house, shaded, and liberally supplied with water. There are few flowers more valued at Christmas-time. It is sometimes difficult to get good stock for forcing. Those that have been used for indoors should have care after they have done flowering, and if divided up carefully, taking care not to damage the points of the roots, and planted in deep loamy ground, they will make good stock; the crowns must be kept well below the surface when planting.

Crocus.—Select strong bulbs and pot as early as possible. Any ordinary potting compost may be used. They may be placed outside, and covered with fibre-refuse or cinders until they are rooted through, when they may be given a little heat to start them. Liquid manure gives strength and colour to the flowers.

Dielytra.—Plants intended for forcing should be taken up in the autumn, potted, and kept in a cold frame until required for starting. The first batch may be put into warmth in January, under a stage in an intermediate house being a suitable place. A covering of fibre-refuse will serve to keep them moist and dark. When the growths show through the fibre the plants may be moved



Fig. 753.—*Viburnum plicatum*.

spade are not filled in, the object being to allow both sun and air to get to the roots. In September they are potted and plunged until wanted. When required for Christmas, they are put into a dark house having a temperature of 70° to 85°, and kept well syringed; the heat and darkness blanches any coloured varieties. When required in spring, less heat is given, though a high temperature is often resorted to to get flowers quickly.

After flowering, the plants are cut back to two or three eyes and stood in a cool house to break. When all danger of frost is gone, they are planted in the nursery and rested for at least a year. Those which have been subjected to great heat require two years. While in the nursery all weak wood and suckers are pruned away, a few strong shoots only being allowed to remain. By growing them on, large plants may be obtained carrying thirty or forty heads of flowers each. Small plants bearing four or five heads of flowers are sometimes grown in 5-inch pots by grafting the varieties on Ligustrum, but the stock and scion do not suit each other. The varieties used are Charles X., Marie Legray, Rubra de Marly, Souv. de L. Spath, President Grévy, Madame Lemoine, and Alphonse Lavallee.

S. persica, the Persian Lilac, may be forced in an intermediate temperature, and may be used two years in succession.

Viburnum Opulus, the Snowball Tree, is easily forced, but if great heat be used the flower-stalks are weak and easily broken. *V. macrocephalum* has immense heads of flowers; *V. Tinus*, the *Laurustinus*, may be had in flower from Christmas onwards. *V. tomentosum plicatum* (fig. 753) has dense heads of pure-white flowers, and is one of the best. All should be rested alternate years.

Wistaria chinensis (fig. 754) is particularly pleasing when forced early. Plants for the purpose should be established in pots two years before they are forced.

Zenobia speciosa and its variety *pulverulenta* pro-

to a light, sunny position. If started too early, or in too high a temperature, leaves are developed instead of flowers. When the plants are in active growth manure water may be used freely. A light, airy position is essential.

Freesia.—Bulbs that have been ripened off early may be potted about the end of July in a light, rich compost of leaf-mould, stable manure, and good loam, in equal parts, with sand. They should be an inch below the surface. They may be stood outside in a sunny position, giving water sparingly. If removed to a pit before the frosty weather sets in, and transferred to a shelf in an



Fig. 754.—*Wistaria chinensis*.

intermediate house about the middle of November, with careful watering they will flower well early in the year; or by placing them in a frame till October, and then removing them into warmth and sunshine, they may be had in flower before Christmas.

Fritillaria.—When well established in pots these may be started early in the year in an intermediate temperature and a light, sunny position; manure may be used freely after they are well started into growth. They must not be allowed to get quite dry, and over-watering must also be avoided. *F. imperialis* (Crown Imperial) and *F. meleagris* (Snake's Head or Plover's Eggs) are the two used.

Funkia.—Several of these, if established a season in pots, may be started in warmth and make fine pot plants, the foliage alone being very effective. They should be potted in strong loam and kept in a frame, not allowing them to get dry. *F. Sieboldi*, and the variety *variegata*, *F. grandiflora*, and *F. undulata* may be recommended. The variegated forms are prettier than when grown out-of-doors, and their leaves are extensively used during the spring by the London florists.

Gladiolus.—Several sorts are useful for early forcing. Early in the autumn the bulbs should be potted in a good

loamy compost, planting several together in a 6-inch pot. They may be placed in a cool pit, or in any position where frost cannot reach them. When growth is visible above the soil they may be removed to a warmer position to flower quite early in the year. The sorts that force well are Colvillei, and the white form alba, The Bride, Brencleyensis, and Gandavensis.

Hyacinth.—For early forcing a great deal depends upon securing firm, well-matured bulbs. The treatment cannot increase the number of flowers, but their size and the strength of the spikes may be improved by good culture. They should be treated as advised on p. 450 until required for forcing. If the roots are not then well through they should only have a moderately warm position for a time, and an inverted pot may be placed over those not well advanced in growth. As soon as the leaves open and leave the spikes free they should have all the light possible, and may be liberally supplied with liquid manure. The following sorts force well:—

White.—Blanchard, Baroness van Thuyl, La Grandesse, Mde. Van der Hoop, Mont Blanc, Grandeur à Merveille (blush).

Pink or Red.—Gigantea, Norma, Robert Steeger.

Blue.—Adeline Patti, Baron van Thuyl, Charles Dickens, Czar Peter.

Yellow.—King of the Yellows, La Pluie d'Or, La Citronnière, MacMahon.

Iris.—The varieties of both English and Spanish Iris may be forced for early flowers, and they provide a number of bright tints in colours which are much appreciated. Potted in good loam, leaf-mould, and manure, and placed in a cool, shady position in a frame, they soon respond to a little extra warmth, and may be had in flower some weeks earlier than those in the open ground by giving them an ordinary greenhouse temperature. Some useful sorts are Bleu Céleste, Miss Barkley, Mountain of Snow, Mont Blanc, and Pourpre Blenatre.

Lilium.—The most useful for forcing are *L. longiflorum*, *L. Harrisii*, *L. candidum*, *L. speciosum*, and the variety *album*. The bulbs should be potted as early as possible after they are ripe in good yellow loam, leaf-mould, and manure, planting them rather low in the pots, so as to allow space for top-dressing later. With plenty of light and air they may be hastened on with heat, but in dull, dark weather heat will only make the flower-stems weak and lanky.

Lily of the Valley.—German crowns are preferable to either Dutch or English, the flowers being larger and opening all at one time. The single crowns may be potted twelve to twenty-four in a 4- or 6-inch pot, or they may be planted in small boxes and covered with fibre-refuse or other similar material, which should remain until they are well started. For early forcing a close pit with plenty of bottom-heat is desirable, plunging the pots in moist material, keeping them close and dark until the flowers begin to open, when they may be gradually exposed to light, but not to bright sunlight. If moved into a rather cooler position for a few days before cutting they will last longer.

Marguerite.—These are now popular flowers for winter, the best white being Halleri maxima, also used for summer bedding. Cuttings struck early in the spring may be grown on as for bedding, and potted on into 5-inch pots to stand in the open until early in July. They should then be cut back close and all old leaves removed. As soon as they start into growth again they may be potted into pots one size larger in rather poor soil to check excessive growth. When they begin to

flower, a little weak manure water may be given. They should be well set with bloom in September to flower well in winter. A light, airy house or frame is essential, and a temperature never below 40° F. Should the leaves be attacked by maggot, they should be syringed frequently with a weak solution of paraffin, taking care to keep it well mixed during the application.

Mignonette.—To obtain plants to flower in winter and early spring, seeds should be sown early in August in pots filled firmly with a compost of loam, rotted manure, and lime rubbish, and placed in a sunny frame or on a shelf in a greenhouse. Short, sturdy growth, well advanced before November, should be aimed at. With light and air a little artificial heat may be given, but in dull weather the cooler the treatment the better, or the flower-spikes instead of advancing will go blind, and leafy side-shoots will start from the base. Liquid manure may be given when the plants are about an inch high, unless the growth is too gross, when it should be withheld until the flowers begin to open. Some growers sow earlier and grow the plants singly in pots, pegging the stem down so as to secure a number of lateral shoots. Plants so treated keep dwarf, and generally flower well.

Narcissus.—The majority of the varieties may be used for forcing, and may be used either as pot-plants or for cut flowers from Christmas onwards, or even earlier, the Paper White, early Roman, and others of the Polyanthus section, if started early in the autumn, coming into bloom early in December. Bulbs intended for forcing should be potted in September in a compost of loam, leaf-mould, and cow-dung, and placed where they can be protected from frost, covering them with fibre-refuse or other light material. When taken indoors they may be started under a stage and removed to a lighter position as soon as the buds show. They will not bear much heat, the buds being apt to go blind if hurried. The common double Daffodil is one of the best for early work. The best of the Polyanthus section to force for early flowers are:—Bazelman Major, Grand Monarque, Grand Soleil d'Or, Grootvorst, Mont Cenis, Prince Metternich, Queen of the Netherlands.

Schizostylis coccinea is a useful plant for winter flowering when well established in pots. It will flower early in the year in an ordinary greenhouse temperature.

Snowdrop.—Grown in pots these only require the protection of a frame to have them in flower at Christmas; or if we get severe weather they may be put where there is sufficient warmth to keep out frost; or they may be brought on earlier by placing them on a shelf in a warm greenhouse.

Solomon's Seal.—The strongest crowns should be selected, and about six potted together in 6-inch pots. They will start vigorously if placed in a cool house in a shady position, and kept moist by covering them with ashes or fibre until they have made a good start. They go well with Dielytra, and may be treated in a similar manner. The dwarf form may be grown in 5-inch pots.

Spiræa (Hoteia).—Imported roots are preferred for early forcing. They are potted up as soon as received, and placed in a cool place, giving more warmth after they have made new roots. The crowns should be covered and kept quite moist, but not too wet, or the roots will rot. After they have started they should have a light position in an intermediate temperature, too much heat causing the flowers to develop too early and weak. *S. palmata* should not be started until early in February. It forces badly if placed in a higher temperature than that of an ordinary greenhouse. In addition to the common

S. japonica and *S. palmata* there are several of recent introduction, viz. *astilboides floribunda*, *compacta multiflora*, and *palmata alba*.

Tuberose.—The time of flowering may be regulated by potting some of the bulbs as soon as received and keeping the others dry and cool, to be potted later. All growths except the central crown should be removed as they show. The Tuberose requires more heat than many plants that are forced; a little manure, if given after the flower-spikes are well advanced, will ensure well-developed blooms. Bulbs potted late for flowering in autumn and winter may be placed out-of-doors, but when the flower-stems push up they should be taken indoors. They may be kept back to flower at Christmas by keeping them cool and dry until about six weeks before they are wanted, but the flowers will not develop well if kept too cold after they begin to show. Aphides, if not kept off, will spoil the flowers; tobacco fumigation when the flower-stems are well advanced will prevent this.

Tulips.—These are particularly appreciated early in the year. The bulbs should be potted early as advised for Hyacinths, and treated in the same way. For early forcing they may be started as soon as the roots are well round the pots. For cut flowers they may be grown entirely in the shade, but for pot-plants they should be given more light, or they get tall and weak. Heat may be given as circumstances require; those grown in a high temperature come on quickly, but the flowers will not be so large as those brought on more gradually. Liquid manure may be given freely, and will increase the size of the blooms. The best sorts for forcing are:—

SINGLE-FLOWERED.

White.—Duc van Thol (white), La Reine, Pottebakker, White Swan, L'Immaculée (very early), Princess Marianne (tinged pink).

Pink.—Rose Aplatie, Rose Gris de Lion, Van Googen, Rachel Ruisch.

Red.—Duc van Thol (scarlet), Couleur Cardinal, Crimson King, Joost van Vondel, Koh-i-Noor, La Riente, Proserpine, Rose Luisante, Van der Neer (dark-purple), Vermilion Brilliant, Wouwerman, Prince of Austria (dark-apricot).

Yellow.—Canary Bird, Chrysolora, King of the Yellows, Mon Trésor, Ophir d'Or, Prince de Ligny, Yellow Prince, Thomas Moore (apricot-orange).

Variegated.—Caméléon, cream, spotted rose; Cottage Maid, rose-pink and white; Couleur Ponceau, cerise, flushed white; Duchesse de Parma, red, broad yellow edges; Eleonore, purple, edged white; Keiserskroon, rich-crimson, yellow edges; La Précieuse, rose, bordered white; Rosamundi, crimson, rose, and white; Wapen van Leiden, rose and white.

DOUBLE-FLOWERED.

Rose Blanche, white; Murillo, rosy-white; Rosine, rose; Lady Palmerston, rose; Salvator Rosa, deep-rose; La Matador, scarlet; Rubra Maxima, dazzling scarlet; Titian, scarlet, yellow edges; Tournesol, scarlet and yellow; Velvet Gem, crimson, yellow edges; El Toreador, chestnut, edged orange; Couronne d'Or, orange-yellow.

[A. H.]

CHAPTER XXXIX.

RETARDING PLANTS.

In contradistinction to forcing or accelerating the growth of plants by the application of heat, we have now the practice of retarding or holding back growth by the application of a low temperature, artificially produced by means of air-compressing machines and freezing mixtures from the combination of ice and salt. Plants, roots, and bulbs of various kinds which have been kept in a freezing temperature for weeks or months will, when placed in a little warmth, grow and develop their flowers with the same vigour and perfection as when treated naturally. Everyone must have noticed that vegetation is at a stand-still when locked up by winter frost and snow, and that under the effects of spring warmth and sunshine growth begins, as it were, with a sudden rush.

"Nature herself forces her flowers during mild or warm and showery weather, and she also retards them during prolonged frost. Herein lies the principle on which the gardener has been practising for the past two or three centuries or more, but so far he has done more in the direction of the application and conservation of natural and artificial heat than in that of the judicious application of cold temperatures. But all this is now altered, and in future great developments may be expected from cold storage and the refrigerating chamber as modern horticultural appliances. Hardy plants that lose their leaves in autumn will be so treated that nature's strength and sun-stored vigour will lie quiescent, it may be, for the time, but full of suppressed life, ready coiled up, as it were, for a spring when removed to a moderately warm and genial atmosphere. Not merely flowers, but vegetables, such as Rhubarb, Sea-kale, and many other things, may be treated in modern fashion by retardation. But perhaps the greatest gain will be in the application of the retarding process to hardy deciduous fruit trees in pots or otherwise, so that we may have crops of fresh Cherries and Plums or Peaches and Grapes any day in the year, and with far greater certainty or precision and much less trouble and labour than is at present the case."—*Field*.

In the nursery of Mr. Thomas Rochford, near Cheshunt, there are four refrigerating chambers of a capacity of about 65,000 cubic

feet, in which roots, bulbs, &c., are stacked in single layers in such a way as to allow of a circulation of freezing air amongst them. This air is supplied by a large engine, worked by two large marine tubular boilers, capable of reducing the temperature of the chambers to 90° below freezing-point; it is not, however, necessary to maintain a temperature anything like so low as this.

When the plants are removed from these chambers they are placed at first in a temperature of 45° or 50° for a few days, and kept shaded until they have made some growth, when more light and heat are afforded.

Azalea mollis, after having been retarded, requires a moist, shady position and frequent syringing until the buds burst, when more light and heat may be afforded.

Hoteia (*Spiræa*) *japonica*, and *H. palmata*, which have been retarded, start into growth very quickly if placed in a cool house and kept shaded until they have made new roots. They take from five to eight weeks to flower.

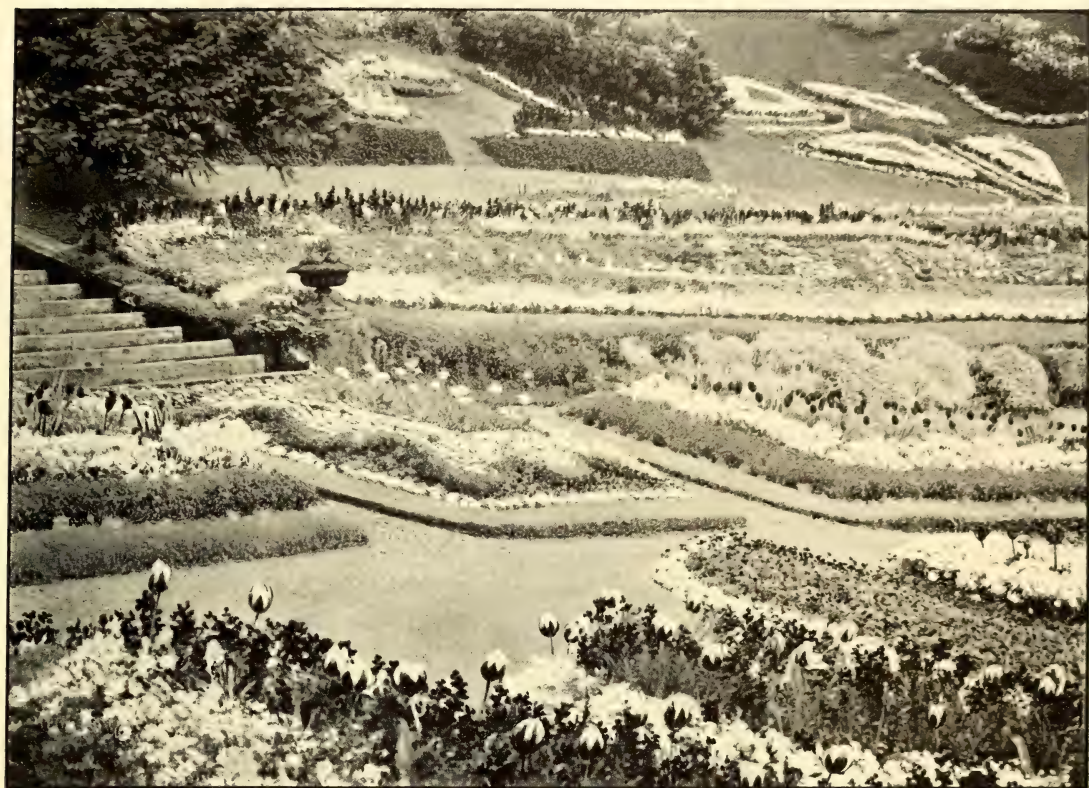
Lilium.—These require care to prevent the growth from pushing in advance of the roots, which will have an injurious effect on the blooms. They should be kept in a cool, shaded position until they are well rooted. To get them into bloom at any particular period a little extra warmth may be given after the buds begin to show, but the flowers lose substance in consequence.

Lily of the Valley is particularly amenable to this treatment, the retarded crowns starting as freely and as vigorously as those treated in the ordinary way. When taken out of the retarding chamber, they should be started in a cool house in shade and moisture, covering them with moss or some other light material for a few days, and in about three weeks they will be in full flower; in autumn and winter they may take a week or so longer.

CHAPTER XL.

SPRING BEDDING.

The objections made against some forms of summer bedding do not apply in the case of what is known as spring bedding, or filling the flower beds in October with plants to flower in the spring. These spring flowers are always welcome; and no matter how exposed the situation may be, a number of plants may always be found to brighten it in the early portion of the year. The ideal situation for a spring garden is a warm hill-side, sloping to the south, and sheltered on the north, east, and west sides with trees, chiefly evergreens, and if a few groups of trees and shrubs are planted on the south side, some distance from the beds, they will afford shelter from the south-westerly



EXAMPLES OF SPRING BEDDING AT BELVOIR CASTLE

gales. Such a position will be comparatively warm in winter, and consequently the flowers will appear earlier, whilst the tender varieties



Fig. 755.—*Anemone Hepatica*.

will have the advantage of shelter during severely cold weather.

The plants suitable for this purpose are by no means numerous; on the other hand, their colours are varied and pleasing. The following can be recommended for gardens in all except the extremely cold parts of the United Kingdom; others of less hardy nature may be added for gardens in the warmest parts, *i.e.* Devon, Cornwall, &c.

AJUGA reptans purpurea, useful for its dark-purple foliage in close tufts; height, about 3 inches. Propagated by division in May.

ALYSSUM saxatile.—One of the most effective of yellow-flowered plants for spring bedding, flowering freely from April to June. Propagated by division in May, or by seed sown under glass in March and transplanted to the open border in April.

ANEMONE.—Although this genus includes some of our earliest and prettiest spring flowers, they are not suitable for bedding owing to the necessity of planting them in August. They cannot therefore be used where ordinary summer-bedding plants occupy the beds in the summer. *A. angulosa* is one of the most useful; its blue flowers are produced in March. *A. fulgens* is quite hardy and produces its brilliant scarlet flowers in March. There is a double-flowered form of it. The *Aldborough Anemone* is another form with larger flowers, remarkable for richness of colouring, including purple, crimson, and scarlet shades, with a white eye-like ring at the base of the cup. *A. Hepatica* (fig. 755), of which there are single and double red, blue, and white forms. The red is most effective, but it does not succeed in some places, owing to peculiarities of soil and situation. A warm dry soil, rich in humus, suits it best. Anemones dislike frequent removal. They flower in March.

ARABIS albidia is one of the earliest plants to flower, but it must not be used too freely, as it is apt to look untidy before the other plants are at their best. It

flowers in February and March. Propagated by division after flowering. *A. albidia variegata* is the most useful variegated plant we have for spring bedding. It is less robust than the green form, and requires closer planting. *A. lucida variegata* is yellower than the last named, and more compact.

AUBRIETIA deltoidea.—There are many varieties of this plant, the best being *græca*, blue; *Hendersoni*, dark-purple; *Ingrami*, rosy-pink, fine large flower; *Leichtlini*, bright-rose; *variegata*, pretty variegated foliage. These are most useful for spring bedding. They commence flowering about the middle of April. Propagated by division not later than March. A few of the largest plants should be reserved for this purpose when filling the beds in the autumn. The varieties do not come true from seeds.

AURICULA.—The alpine varieties are useful bedders. They should be planted rather closely together in a cool position; or some low-growing plant, such as *Saxifraga moschata*, may be worked in among them to cover the soil. They flower in April. Propagated by division after flowering, or by seeds sown as soon as ripe in a shady place.

BELLIS perennis.—The double Daisies, including white, pink, and red varieties; indispensable in the spring garden for edgings and small beds. The variegated-leaved variety known as *aucubefolia* is also very useful, but is more difficult to grow. Increased by division in May. Time of flowering, March to May.

CAREX riparia variegata is useful for breaking the surface of beds as a "dot" plant, and for associating with stiffer-growing things. It grows 1 foot high, and dies down in winter. Increased by division in May.

CERASTIUM tomentosum.—A dwarf-growing gray-leaved plant, useful for edging purposes. Increased by cuttings.



Fig. 756.—*Chionodoxa*.

CHIONODOXA (fig. 756).—The several species are of the prettiest of the spring-flowering bulbs which may be planted 6 inches deep, out of the way of the summer bedding, where they will grow and thrive much better than when replanted annually. Flower in March and April.

CROCUS.—Many of these are useful. They may be dotted thickly among Daisies and other low-growing plants, as they flower early from February onwards. Mice and pheasants are especially fond of them.

DORONICUM austriacum, a deep yellow-flowered composite, growing about 15 inches high and flowering early in April. *D. plantaginicum* is similar to the preceding, but taller, 2 feet or more high, and therefore useful for backgrounds and for beds at a distance. Propagated by division in May, and by seeds sown in March.

ERANTHIS hyemalis.—The well-known Winter Aconite. The roots may be planted deeply and left permanently in the beds, as they are apt to become a nuisance if lifted and replanted every season.

ERICA carnea, purple, and *alba*, the white variety, commence flowering in January and continue until the middle of March. They should be planted in peat when making growth, but it is not necessary during winter and spring if the soil in the beds is free from lime, or nearly so. Increased by division after flowering.

GALANTHUS nivalis, and its double form, and *G. Elwesii*, are the most useful of the Snowdrops for spring bedding. They should be planted deep enough to allow the summer-bedding plants to be put in and taken out without interfering with the bulbs.

HELLEBORUS.—The Lenten Roses, such as *H. abchasicus*, *H. colchicus*, *H. olympicus*, *H. orientalis*, and their numerous hybrids, are useful as "dot" plants among beds of Violets, Winter Aconites, &c. Their flowers—although not showy—last a considerable time, and their foliage is elegant. They should be planted in permanent positions whenever possible, as transplanting weakens them. They flower from February to April. Increased by division after flowering, and by seeds.

HEUCHERA hispida (Richardsoni), has dark velvety brown leaves, which are effective when associated with flowering plants. Propagated by division in May.

HYACINTH.—The single varieties are the best bedders. They look very formal if planted in straight lines, and are better when disposed somewhat irregularly in the beds, with some low-growing plant, such as Aubrietia, Arabis, Saxifraga, or double Daisy, underneath. The brighter-coloured sorts are the most useful bedders, such as:—*Blue*—Grand Lilas, La Peyrouse; *red*—Robert Steiger, Veronica, Waterloo; *white*—La Grandesse, Grand Vainqueur. They flower in March and April.

LEUCOJUM.—The pretty Snowdrop-like flowers of *L. vernum*, the Snowflake (fig. 757), and its varieties are excellent for beds and borders, and if planted where they need not be disturbed they become established and flower freely in early spring. The petals are pure white tipped with yellow-green. *L. carpaticum* is about a month later; *L. aestivum* has flower-stalks over a foot high bearing clusters of white bells in April or May.

LUNARIA biennis variegata.—The variegated form of Honesty is worth using as a "dot" plant among other things, such as Forget-me-not, or Aubrietia. The variegation does not appear until the spring, when the plant commences to grow. Increased by seeds sown in May and transplanted as soon as large enough.

MYOSOTIS alpestris.—The variety known as Queen Victoria is a week later than the others, and is also stronger in habit and constitution; it grows 15 inches high and flowers in April. Propagated by seeds sown on a north aspect as soon as ripe, transplanting when large enough to a sunny position; also by division, but the plants never succeed so well as seedlings. *M. dissitiflora*, the blue-flowered variety is one of the most

useful, as it gives a mass of pale-blue colour early in April. The variety *alba* is like the preceding except in colour, and it flowers at the same time. It reproduces itself true from seed.

NARCISSUS.—The Ajax section is the best for this purpose, and only those having a strong constitution should be chosen. Some of the best are bicolor, Horsfieldii, bicolor grandis, Emperor, Empress, Irish King (Ard Righ), princeps, &c.; minor nanus forms a very pretty edging if planted thickly; they may be planted deeply and left in the beds during the summer for several seasons. They flower from the middle of March onwards according to the season and variety.

PHLOX amœna grows 6 to 9 inches high and has flowers of a deep rosy-pink colour, produced in April. It spreads rapidly in the spring, and should not be planted closely in the autumn. Propagated by division after flowering. *P. divaricata* grows 12 to 15 inches high and forms handsome cushions of lavender-coloured flowers in April and May. Propagated by division and by cuttings in May. *P. subulata* and *P. frondosa* are useful dwarf plants for edging and for small beds; flowers pink, varying only in the shade of colour. *P. Nelsoni* is white, free, and pretty. They flower in May. Propagated by division and by cuttings after flowering.

POLYANTHUS (Primula variabilis).—A good yellow strain of this is very useful, also other decided colours such as red, dark-purple, and white. Of the latter Gilbert's Harbinger is by far the best, having fine trusses



Fig. 757.—Snowflake (*Leucojum vernum*).

of large white flowers with a yellow eye. They flower in February and March. The gold-laced and show varieties are of less value for bedding. Propagated by division before the middle of April.

PRIMROSE (Primula veris).—The double white, lilac, sulphur, and blue forms are much appreciated where they do well, but owing to peculiarities of soil, or climate, or both, they often fail to thrive.

PYRETHRUM parthenifolium aureum (Golden Feather),

is useful for spring and winter effects. It is easily raised from seed sown in June, or by dividing the plants used for summer bedding.

SALVIA argentea.—The white downy foliage of this fine perennial is most effective where bold foliage is required; it keeps dwarf if the flower-spikes are removed. Raised from seed sown under glass in April, and transplanted to the open ground when large enough.

SAXIFRAGA Campostii (Wallacei) is the best of the white-flowered mossy Saxifrages. It grows 6 inches high, and flowers in May. *S. cordifolia purpurea* is useful for large beds and very hardy in the foliage. *S. crassifolia* is similar to the preceding, but is dwarfer when in flower. *S. ligulata* is the best of the large-leaved section, but it is rather tender. It produces its rosy-pink flowers in March. *S. moschata (muscoidea)* makes a nice mossy carpet for taller plants, such as Tulips, Hyacinths, &c. It bears a profusion of small red flowers in April. Height, 3 inches. Prefers a cool, moist place in summer. Propagated by division in May or June.

SCILLA sibirica flowers early, and is very useful for planting among such dwarf-growing things as *Arabis alba*, *Saxifraga moschata*, *Eranthis*, &c. The bulbs may be planted 6 inches deep, and left permanently. The colour of the flowers does not associate well with other shades of blue or purple. It flowers in February and March. *S. nutans*, the common Bluebell, is also worth a place in large gardens.

SEMPERVIVUM calcarneum (californicum) and *S. montanum* are the most useful of the Stonecrop family, and are best adapted for edgings. Propagated by division.

STACHYS lanata, a downy-leaved dwarf-growing plant, which forms a good white edging in winter, and may also be left permanently. Easily increased by division.

TULIPA.—The most useful bulbs for the spring garden, as they last in perfection longer than Hyacinths and are not so stiff in habit. Some care is required in selecting the varieties if all are wanted in flower at the same time. The following flower together, generally about the middle of April:—*Chrysolora*, yellow; *Cottage Maid*, white edged with pink; *Coleur Cardinal*, dark-red, one of the best; *Duchess de Parma*, orange-red and yellow, very fine; *Keizer's Kroon*, yellow and red, very large and fine; *Prince of Austria*, orange-red; *Royal Standard Striped*, white with red stripes; *Thomas Moore*, dark-orange; *Vermilion Brilliant*, bright-red, one of the best; *Wouverman*, purple. The *Van Thol* family are not recommended as they flower too early and are soon over. Among double varieties the most useful are *Tourmesol*, red and yellow; and *Rex Rubrorum*, bright-red. They flower at the same time as the above selection. *Le Candeur*, white, is ten days later.

VALERIANA Phu-urea.—This has golden foliage early in the season, changing to green afterwards, and is very hardy. Increased by division in May.

VINCA major and its variegated form are useful for vases, &c. *V. minor* and *variegata* are neat-growing plants which thrive well under trees and may be used occasionally as edgings.

VIOLA.—The bedding varieties are almost too late for the spring garden, as they do not commence flowering until May; but some of them are very useful if the display has to be kept up until June. The best are *Admiration*, rich purple; *Ardwell Gem*, yellow; *Blue King*, blue; *Blue Bell*, violet, small flowers; *Cliveden Purple*, reddish purple; *Countess of Kintore*, white and purple; *Skylark*, white bordered with blue; propagated by division in May or June.

VIOLET, *Lady Hume Campbell*, pale-blue, the hardiest of the Neapolitan section. It succeeds well in a sheltered position and flowers very freely in March. Single Russian, increased by cuttings in March or by division of the clumps in May, is well known and is always appreciated.

WALLFLOWER (Cheiranthus Cheiri).—There are many strains of this old favourite. *Belvoir Castle*, yellow, and *Veitch's Dark Red*, are two of the best. The seed should be sown the first week in June, and as it is very liable to be crossed by bees, &c., it should always be procured from a reliable source. Transplant when 2 inches high, in lines 1 foot apart, and 9 inches between the plants. They flower in April.

SHRUBS.—In some positions, such as centres of large beds, vases, &c., where taller plants than the above are required, the following hardy shrubs may be used with excellent effect. If removed to the reserve ground early in spring and carefully looked after they will last for several seasons.—*Aucuba japonica*, *Berberis Aquifolium*, *B. Darwinii*, *B. japonica*, *Buxus sempervirens* and var. *argentea*, *Cotoneaster microphylla*, *Cupressus Lawsoniana* and vars., *C. nootkatensis*, *C. pisifera* and var. *aurea*, *C. plumosa* and var. *aurea*, *C. squarrosa*, *Euonymus japonicus aureo variegatus*, *E. radicans variegatus*, *Juniperus virginiana*, *Pernettya mucronata*, *Picea morinda*, *P. pungens glauca*, *Skimmia japonica*, *Thuja dolabrata*, *T. gigantea (Lobbi)*, *T. orientalis nana* and var. *aurea*, *Veronica cupressoides*, *V. pinguifolia*.

YUCCA recurva is one of the best plants for vases and centres of small beds, &c. It is propagated by offsets and root cuttings whenever they can be obtained.

[W. H. D.]

CHAPTER XLI.

SUMMER BEDDING.

A garden without plenty of flowers in summer is deficient of what should be its chief attraction. The tastes and wishes of the proprietor of the garden, to whose pleasure and enjoyment the gardener has to contribute, must, of course, be the first consideration. As a rule, however, these matters are left entirely to the gardener's judgment. The majority of garden proprietors find satisfaction in bright glowing displays of flower-colour for as long a period as possible, and the most favourable period for this is from June to September. It is easy to find a large number of plants which flower abundantly in May or June and are beautiful for a week or month; but plants capable of keeping up a display of flowers from June to October are not so numerous. To these belong what are known popularly as summer-bedding plants.

The desire for bright colours of lasting character has led also to the introduction into the flower-garden of plants with richly-coloured foliage, such as *Coleus*, *Iresine*, *Alternanthera*,

variegated Pelargonium, and even crimson-leaved Beet.

Bright colour in flower and foliage, if a prominent feature, must be disposed with that correctness of taste insisted upon wherever colour is used for effect, whether it be in house-decoration, in dress, or in a picture. Unfortunately, there has been too often an utter lack of taste displayed by many who have made

summer bedding a speciality, not only in private gardens, but in those places where the public generally go to see flowers. Fantastic designs picked out in the most flaunting colours have been set before the people to such an extent that, although there are still many who see something to admire in them, all whose opinions are worthy of respect have condemned them as abominations, in the garden at any rate.



Fig. 758.—Flower Garden at Kew.

The misuse of a plant, however, should not lead to its disparagement. Not one of the plants that are condemned when seen in these bedding arrangements is unworthy of a place in the garden; indeed, most of them, when rightly used, are capable of producing effects of the most pleasing character. The proper use of such plants is, therefore, a matter of some importance.

Many hardy plants may be used in such a way as to form striking floral effects; indeed it would not be difficult to make a selection that would afford a successional display throughout the summer. As an instance, a large irregular bed or border filled with Ghent Azaleas or similar shrubs, to flower in the early summer, might also contain Montbretias of different colours which would give a display of flower until autumn. Beds of Roses and Mignonette, Hypericums and Pansies, &c., produce lasting effects in summer. Carnations planted in masses, with a carpet of some of the varieties of tufted Pansy, also make pretty and lasting combinations.

Of tender plants suitable for summer bedding

there is, however, a much wider selection. Some plants which might be more largely used are Fuchsias, most charming either in mass or as single specimens in pots on lawns, the pots sunk below the surface. Tuberous-rooted Begonias in suitable situations will produce a display of brilliant flowers throughout the summer, especially in wet seasons, when many other bedding-plants fail. *Calceolaria amplexicaulis* produces a beautiful picture of lemon-yellow flowers. Pelargoniums, both gold and silver-leaved varieties, are valued for their contrast with flowering plants. The newer sorts of Heliotrope, remarkable for the large size of their flower-heads, are certain to become generally used in bedding.

The preparation of the beds is a matter that requires thoughtful attention to ensure the healthy growth of the plants intended for them. Bearing in mind how exhausting to the soil must be the production of such masses of foliage and flower, its renovation should be frequent, such operations as changes of crop, annual trenching and manuring, lime-dressing

in case of fungus disease or sourness, being essentials in good flower-gardening. In strong, deep soils some plants, Pelargoniums for instance, are likely to grow too vigorously and to flower sparingly. The addition of brick rubble or cinder ashes to the soil, and the withholding of manure, would tend to improve matters in this respect. The same principles of cultivation should be applied in the flower-garden as in the kitchen-garden, bearing in mind also that flowers rather than leaves or roots are the desiderata.

The plants which have been in preparation in pits and frames should be thoroughly hardened off before they are planted out. The usual time for this operation is the last week in May or the first week in June. Dull showery weather is of course preferable for the work; should the weather be dry, copious waterings at the time of planting are essential. The plants should be thoroughly moist at the root before they are put out.

Cutting-time, usually about the third or last week in August, is a busy period where there is a large flower-garden, as the number of plants required for the beds in the ensuing year must be decided upon and sufficient cuttings taken to provide them. The usual method is to plant the cuttings in boxes or pans and place them in a sheltered sunny position in the open until they are rooted. The cuttings of such plants as Heliotrope, Ageratum, Coleus, Iresine, and named sorts of Verbena strike better when put in a close frame until rooted. Calceolarias root readily in a cold frame in sandy soil, and may be left there for the winter. Directions for propagation are given with the following brief descriptions of selected plants for summer bedding:—

ABUTILON.—The varieties, mostly of hybrid origin, are now numerous, and some of them are excellent bedding plants:—Boule de Neige, Calypso, white; Caprivi, Royal Scarlet, Fire-King, Le Grand, scarlet; Compactum, Cloth of Gold, yellow; Madame J. Laing, rose-pink. There are several varieties of *A. megapotamicum* with orange and scarlet flowers, and very pretty foliage blotched with yellow. These all grow 3 to 4 feet high if not stopped. The last-named is easily kept dwarf. Propagated from cuttings in autumn or spring.

AGERATUM.—These are most useful for producing broad effects of blue or mauve. The best varieties are Imperial Dwarf and The Zoo. *Enfant de Paris* has dull-white flowers. *Grandiflorum album* (fig. 759) has pure white flowers. They grow from 6 to 9 inches in height. *A. mexicanum variegatum* grows 2 feet high, and is useful for massing in borders. Propagated by cuttings in late autumn and spring.

ALYSSUM maritimum (Sweet Alyssum).—A pretty little annual, free and compact, 4 inches high, with narrow linear leaves and erect heads of small white fragrant flowers.

Most suitable for edging. Var. *variegatum* has leaves margined with white, and makes an excellent carpet for *Lobelia fulgens*, &c. Propagated by seeds or cuttings.

ANTIRRHINUM majus (Snapdragon).—Of this there are many varieties—white, red, pink, purple, yellow, and scarlet-flowered. The Bride, pure-white, Tom Thumb and Scarlet Gem are excellent for beds. Easily propagated from seed or cuttings.

ASTER.—The Michaelmas Daisies are well suited for bedding for autumn effects. Among the best varieties for planting in masses are—Acris, Bessarabicus, versicolor, Novi Belgii, Robert Parker, Harper Crewe, rosea, densus, Shortii, Janus, diffusus horizontalis, and lævigatus. The two first-named flower early in August. Propagated by division in spring.

BEGONIA.—In addition to the tuberous-rooted section, the varieties of which are legion, the following are useful:—

Abundance. Stiff, erect habit, with small, pale, ovate leaves and panicles of pink flowers.

Afterglow. A hybrid resembling Knowsleyana, compact habit, deep-green foliage, flowers soft-rose tinged with carmine.

Ascotensis. Upright habit, bright-green, small ovate leaves, rosy-red flowers in panicles.

Rosea floribunda. A semperflorens form of good habit, with bright-pink flowers.

Semperflorens Sieberiana. Vigorous and erect habit,

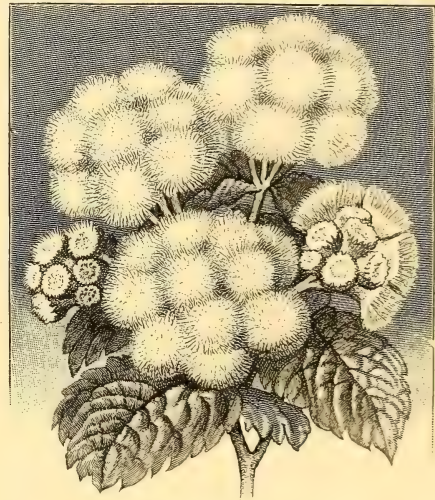


Fig. 759.—*Ageratum grandiflorum album*.

glossy-green foliage, and large flowers of a soft-rose colour.

Var. *carminea gigantea*. Large shining-green foliage, of good habit; flowers carmine.

Var. *rosea gigantea*. Similar to the latter, with rose-coloured flowers.

Var. *alba*. Good habit; large shining-green leaves, flowers white, free.

Var. *Crimson Gem* (Vernon). Dwarf compact habit; leaves bright shining-green, turning to coppery-red; flowers crimson, very free and effective.

Var. *Duchess of Edinburgh*. Similar to *alba* in all but its flowers, which are white margined with pink.

Var. *Princess Beatrice*. Very free, with smaller leaves than the last-named and abundance of small pink and white flowers.

If these are planted out in June, they will flower freely all the summer. About the middle of October, before frost can affect them, they may be lifted, potted, and



Fig. 760.—Dwarf Aster.

placed in a warm house, where they will afford a supply of flowers throughout the winter, as well as cuttings for propagating early in the spring. With the exception of Princess Beatrice all the varieties of *B. semperflorens* are easily raised from seed sown in heat in the beginning of February, yielding plants fit for planting out in June.

CALCEOLARIA.—Very showy and effective when grown

with success, but unreliable, especially in dry seasons. They prefer a cool, rich soil. The best yellows are—*aurea floribunda*, Golden Gem, and Prince of Orange; bronze—Firefly, Sultan, and Sparkler. *C. amplexicaulis* grows about 2 feet high, and looks well in a large bed; it has lemon-yellow flowers. Requires a little heat in winter. Propagated by cuttings in autumn, and wintered in a cold frame.

CALLISTEPHUS (China Aster).—A great variety of forms and colours are now available for summer bedding, Victoria and Dwarf Chrysanthemum-flowered (fig. 760) being the best in habit, their flowers completely hiding the foliage. Propagated by seeds sown in a cold frame in February.

CELOSIA *pyramidalis*.—This attractive plant is best when grown in pots and planted out in July in succession to such plants as Stocks. The tall, elegant, plume-shaped spikes of flowers in various shades of red, purple, silver, and yellow, are very effective. Propagated by seeds in March.

CENTAUREA *ragusina* and **CINERARIA** *maritima* are handsome silvery-leaved plants which are effectively used in combination with Coleus, Beet, or Scarlet Pelargonium. They are almost hardy. Propagated by offsets in spring.

CHRYSANTHEMUM *indicum*.—The dwarf early-flowering varieties may be grown in nursery beds until July, when they can be transferred to beds or borders on a wet day to flower in August and September. Among the best varieties are Madame Desgrange, white; G. Wermig, pale-yellow; Mrs. Hawkins, golden-yellow; Mons. Gustave Grunerwald, pink; Early Flora, yellow; Harvest Home, red and yellow; and White Lady, pure-white. Propagated by cuttings in autumn, and wintered in a cold frame.

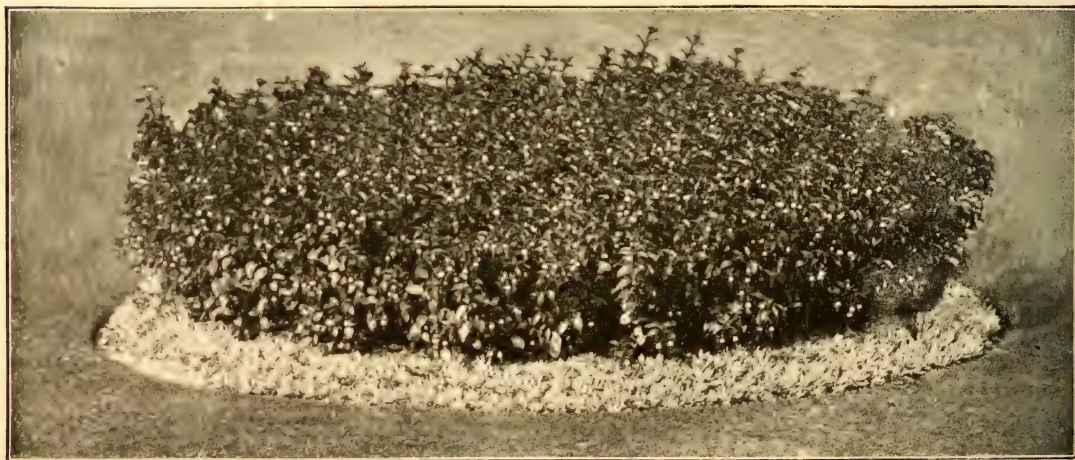


Fig. 761.—A Fuchsia Bed.

COLEUS.—*Verschaffeltii*, Refulgence, and Taylor's Pet are suitable bedders, as they colour well. Propagated in heat in early spring from plants kept through the winter in a warm house.

CONVOLVULUS *mauritanicus*.—A very ornamental trailing perennial with silvery leaves and mauve-purple flowers. Fine for bedding and vases. Hardy in the warmer parts of the country.

CUPHEA *platycentra*.—A dwarf perennial with bushy habit, smooth lanceolate leaves, and tubular flowers coloured scarlet, black and white, produced freely and continuously throughout the summer. Propagated from cutting in the autumn.

DACTYLIS *glomerata variegata*.—One of the prettiest of

grasses, dwarf and beautifully variegated, hardy and of free growth, suitable for edgings to beds and borders. Propagated by division in autumn or spring.

DAHLIA.—The varieties recommended as bedders are Alba floribunda, white; Carl Mendel, deep crimson; Gem of Dwarfs, crimson, tipped white; George Thompson, yellow; King of Dwarfs, dark-purple; Scarlet Globe, orange-scarlet; Sambo, rich-maroon; White Bedder; Pluton, yellow; and Flora Macdonald, primrose. These are showy and free, and they range from 2 to 3 feet in height. The Tom Thumb varieties also are useful for bedding. Propagated by division or cuttings in spring.

FUCHSIA.—Many of the varieties are useful bedding-plants (fig. 761), flowering from early summer till late in

autumn. Some of the best are—Lye's Rival, red sepals and purple corolla; Lye's Own, white sepals and red corolla; Madame Corneillon, scarlet sepals and white corolla; Beauty of Trowbridge, white sepals and pink corolla; Wave of Life, a dwarf golden-leaved variety, scarlet sepals and violet corolla; Meteor and Sunray are two good dwarf variegated kinds. Riccartoni, globosa, and corallina form good permanent beds or specimen plants. Propagated by cuttings.

GALLIARDIA grandiflora.—A beautiful hardy perennial with lanceolate leaves, and large orange flowers with crimson centre, from 2 to 3 feet in height; deserves to be more extensively cultivated. The old flower-heads should be removed to promote continual flowering. Cuttings make the best bedding-plants.

GALTONIA candicans.—A very graceful bulbous plant, with Hyacinth-like leaves, producing tall, erect scapes of pendulous, funnel-shaped, pure-white flowers. Planted in mass they are very effective. The bulbs may be left in the ground all winter. Propagation from seed or division.

GAZANIA splendens.—A beautiful trailing plant with linear-spathulate leaves and large Marigold-like flower-heads coloured bright-orange with zones of black and white; they open only in sunny weather. A very useful edging plant. There is a variegated form. Propagated from cuttings in autumn.

GLADIOLUS.—These should form prominent features in every flower-garden, as they make a rich display of colour during the summer and autumn if planted in masses or mixed with other and shorter plants.

HELENIUM pumilum.—A hardy perennial 18 inches high, covered with golden-yellow flowers all the summer. An excellent plant for permanent beds. Propagated by division.

HELIOTROPE, "Cherry Pie".—There are now many varieties, from white to deep-violet. The best are—Queen Marguerite, very large dark-blue; Swanley Giant, bright-blue; President Garfield, bright mauve-purple; White Lady, pure-white; Mina, medium-blue; and Miss Nightingale, purple. Propagated from cuttings struck in heat in spring.

HUMEA elegans (fig. 762).—An elegant plant, with fragrant, large, lanceolate leaves and tall gray-red flower-spikes resembling grass-plumes, suitable for mixed beds or planting singly. Requires a good rich soil. Seed should be sown in heat in spring, and grown on in pots all summer, then shifted into larger pots for flowering the following summer.

IMPATIENS balsamina.—There are varieties of this with rose, cream, red, pink, or purple flowers which come true from seeds sown in April in heat, and grown in rich soil in pots to be bedded out in June. They frequently do well until the middle of October.

IRISINE.—Half-hardy perennial plants, with purplish foliage, growing about a foot in height. They require warm, bright weather to develop their colour. *I. Herbstii* has roundish purple leaves variegated with crimson; *I. Lindeni* has lanceolate flat dark-crimson leaves; aurea reticulata is striped and variegated with yellow. Brilliantissima and Wallisi are good plants for edging and ribbon borders. Propagated from cuttings in heat in spring.

ISOTOMA axillaris.—A tufted, Lobelia-like plant, requiring similar treatment, from 9 to 12 inches high, and flowering profusely in the summer, its small flowers being of a pale-blue colour. Propagated by cuttings in heat in spring.

LANTANA.—Showy Verbena-like plants of erect shrubby

habit. Some of the best varieties are—La Neige, pure-white; Rutilant, deep-yellow; Ne Plus Ultra, rosy-pink shaded yellow; Distinction, bright orange-scarlet; Magenta King, bright purple-scarlet; and Eclat, reddish-crimson and orange. They flower freely and continuously all summer, preferring a warm sunny position and good soil. Propagated by cuttings in spring.

LATHYRUS odoratus.—The Sweet-pea forms showy beds if not planted too thickly and provided with dwarf trellis-work or short spray boughs. Seeds should be sown thinly in pots, and each variety kept separate. If not allowed to fruit they continue to flower till late in the year.

LILIUM.—Several species can be usefully employed as bedding-plants, being most effective when mixed with other things. The bulbs should be started in pots in autumn and planted out in May to flower from July onwards. A mixture of rich loam and a little peat suits them best. *L. auratum*, *L. speciosum* and its varieties; *L. Harrisi*, *L. longiflorum*, *L. Brownii*, *L. croceum*, and *L. tigrinum splendens* succeed with this treatment.

LOBELIA.—The varieties of *L. Erinus* used as bedding-plants are numerous, those of dwarf tufted habit being specially adapted for edging and carpet-bedding, whilst the trailing kinds are useful for vases or for massing in beds. Some of the best blues are—Barnard's Perpetual,



Fig. 762.—*Humea elegans*.

Emperor William, Bluestone, Picotee, Swanley Blue, King of the Blues, and Brilliant; the best whites are—Snowball, Mrs. Murphy, and nivea; aurea is a golden-leaved variety with bright-blue flowers. Cuttings in autumn.

L. fulgens (fig. 763) and its forms are tall perennials of erect habit 2 to 3 feet high, with spikes of brilliant crimson or magenta flowers and dark purplish foliage; they are invaluable for bedding. A particularly gorgeous effect is produced by planting them amongst variegated Alyssum or Dactylis. The fleshy root-stocks should be taken up in October and stored in a cold frame in boxes of light soil for the winter. Propagated by division or seeds.

MATTHIOLA annua.—The Ten-week and Intermediate Stocks are useful for bedding for early effects, to be fol-

lowed by summer Chrysanthemums or Michaelmas Daisies. There are, however, at least two good white perpetual-flowering varieties, viz. Princess Alice and Veitch's New White Perpetual, which have immense spikes and continue to flower until late in the season.

MONTBRETIA or *Crocsmia aurea* and its forms are hardy, very free in growth in any ordinary soil, and they flower freely all summer. They soon cover a large area if left undisturbed. In cold districts they should be lifted, and the bulbs and stolons stored in dry soil in a shed for the winter, replanting them in the bed or border in April. They vary in colour from orange to crimson and yellow, and they grow from 18 inches to 2 feet high.

NEIREMBERGIA gracilis is a pretty trailing plant with slender leaves and white and purple flowers on thread-like stalks, and is very ornamental in a light warm soil fully exposed to the sun. Useful for vases. Propagated by cuttings in spring in heat.

PELARGONIUM.—The king of bedding-plants, whether considered for its flowers or for its beautifully variegated leaves. Of those grown only for their flowers the best bedders are:—Scarlet—Vesuvius, John Gibbons, Triomphe de Stella, West Brighton Gem; crimson—Henry Jacoby, Rev. Atkinson, and M. Myriel; pink—Master Christine, Mrs. Henry Cannell, Beckwith's Pink, and Mrs. W. Brown; salmon—Lucy Mason, Surprise and Mrs. Holford; white—Snowdon and Albion. Those grown for their foliage are:—Silver-edged—Flower of Spring, The Bride, Bijou, and Dandy; golden-leaved—Crystal Palace Gem, Verona, and Robert Fish; golden tricolor—Mrs. Pollock, Mr. H. Cox, and Prince of Wales; bronze—Zulu, Bronze Queen, and Best Bronze. Among the best of the Ivy-leaved varieties are Souvenir de C. Turner, deep rosy-pink; H. Cannell, rosy-scarlet; Ryecroft Surprise, salmon-pink; Beauty of Jersey, scarlet; Madame Crousse, pale-pink; Jeanne d'Arc, white suffused lavender; Madame Thibaut, deep-pink; and Mignon, salmon. Aureum marginatum, l'Elegante, and Duke of Edinburgh are variegated forms of the Ivy-leaved section. All bedding Pelargoniums should be propagated from cuttings in August to obtain strong plants before the winter. The tricolor varieties should be wintered in a warm dry house or frame; cuttings may be rooted with facility in heat in spring.

PENTSTEMON.—The improved forms now in cultivation are among the most valuable of all bedding-plants, as



Fig. 763.—*Lobelia fulgens*.

they form compact, sturdy bushes 18 inches or so high, and flower freely till winter; their colours are various shades of rose, pink, scarlet, purple, lilac, and white. They succeed best in a good loam enriched with manure. The named kinds must be propagated from cuttings in September in a cold frame, where they should remain for the winter; and if put out in April they will begin to flower in June. Mixed varieties are raised from seeds.

PERILLA nankinensis (fig. 764).—A purplish-leaved, half-hardy annual, much used in summer bedding. *Atropurpureus* is a variety with darker lacinate foliage, a very elegant plant; *macrophylla compacta* is dwarf with curled foliage, useful for ribbon borders. Propagated by seeds sown in heat in February.

PETUNIA.—Half-hardy perennials, which have been considerably improved of late years, and now rank among the best of summer-flowering plants for the out-door garden, being very showy and floriferous. There are many named varieties, some of the best being—Delicata, white, striped purple; Miss Amy, crimson and white; Spitfire, dark purplish-crimson; Dr. Hogg, purple with white throat; and Countess of Ellesmere, rosy-crimson with light throat. Propagated from cuttings in August. Excellent varieties may be had from a good strain of seeds sown in March in heat, and the plants grown on in pots in a sunny frame until they flower, when the colours may be sorted.

PHLOX.—The erect perennial species form magnificent beds where tall plants are admissible; there are many beautiful varieties varying in height from a foot to 3 feet (see special article on p. 487). Propagated by division or cuttings in spring. *P. Drummondii* in its many forms is also very useful, *rara compacta*, Sunrise, and Snowball being specially suitable for edging small beds. Propagated by seeds sown in March.

PLUMBAGO capensis, a half-hardy shrub, is invaluable for planting out in summer, its lovely pale-blue flowers being produced very freely in clusters throughout the season. Small plants are suitable for edgings. *Larpenae*, a hardy perennial, 8 inches high, with trusses of deep-blue flowers changing to violet, is a fine edging plant for



Fig. 764.—*Perilla nankinensis*.

slightly-raised beds. Increased by division in early spring. Propagated from cuttings in heat.

POLEMONIUM caeruleum and the variety *variegatum* are

good plants for flower-beds, and if kept pegged down are suitable for carpeting or edging beds, their Fern-like leaves being pretty and attractive. If grown for foliage alone, the flowers should be removed as they appear. Propagated by division.

SALVIA.—Many of these easily-grown plants may be utilized in the flower-garden. One of the best is *S. patens*, with rich deep-blue flowers produced all summer. *S. splendens* has bright-scarlet flowers, and is at its best in autumn. Propagated by cuttings in autumn in heat.

TAGETES *patula*, the French Marigold, and *T. erecta*, the African Marigold, are very showy bedders, though not much used. *T. tenuifolia* and *T. pumila* are also good dwarf bedders. Propagated by seeds sown in heat in spring.

TROPEOLUM.—The dwarf or Tom Thumb section is useful for bedding. The best forms are—Mrs. Clibran, golden-yellow; Mayes Seedling, deep-yellow; Bedford Rival, dwarf scarlet; Vesuvius, brilliant scarlet; The Moor, dark-maroon; and Hermine Grasshoff, double orange-scarlet. Named varieties propagated by cuttings; others by seeds.

VERBENA.—Bedding Verbenas (fig. 765), of hybrid origin, have always been favourites for the flower-garden, as they possess many charming qualities and are of easy culture.



Fig. 765.—Bedding Verbenas.

Young plants should be kept growing during the winter, by placing them close to the roof glass in a dry house, dusting them with sulphur occasionally to keep down mildew. After planting them out the shoots require to be stopped and pegged down frequently so as to produce a close cushion-like growth and an abundance of flowers. Some of the best bedders are Ball of Fire, Blue Beauty, Crimson King, Boule de Neige, Purple King, Lulu, Grace Darling, Stadtgartner Schwarz, Melindris Splendens, Lord Brooke, and Miss Willmott.

V. venosa, a hardy perennial of erect growth, with purple-blue flowers, is a useful bedding-plant easily raised from seed. The hybrid sorts are propagated annually by cuttings in August, and again in spring if required. A new race of *Verbena* named *compacta*, of erect growth and about 6 inches high, is very suitable for bedding purposes. Seeds should be sown in a little heat in March, transplanting the seedlings to the open ground in June.

[E. B.]

CHAPTER XLII.

CARPET-BEDDING.

Those gardens in which the arrangement of the plants is most diversified afford most pleasure and interest, and the arrangement of the plants employed in carpet-bedding should form a pleasing contrast to the less formal and quieter disposition of the plants in other parts of the garden; if done with taste and with due regard to the fitness of the plan to the surroundings, carpet-beds may form not the least pleasing of its features.

Carpet-bedding is a geometrical arrangement of neat, dwarf-growing plants in beds, which should be flat, and slightly raised above the ground level. When foliage plants only are employed they have an advantage over flowering plants, in that wet weather does not affect

their colours as it does when flowers are used. Should the plants at any time become too luxuriant, they must be clipped or pinched back, at least once a week in hot, growing weather, to preserve the design. This is so essential, that carpet-bedding should not be attempted unless labour can be afforded for the weekly trimming. Richly-coloured beds are not always desirable, a quieter scheme of colour being as a rule most pleasing.

This may be secured by the free use of such gray-greens as are to be found in some succulent plants, such as *Echeveria*, *Sempervivum*, *Sedum*, and *Saxifraga*. Rich colours like scarlet and yellow must be used with care, and the darker colours, such as crimson and brown, should be employed as a rule only near to or in the centre of a bed.

The question of colour arrangement is of so much importance that a few general rules may be given. The primary colours, yellow, red, and blue, when true, may be placed together in some arrangements and the effect will be pleasing; as a rule, however, the colours of the flowers or plants selected are not quite true, and it is better therefore to avoid such extremes. These colours combined give birth to the composite colours. Thus orange is a blending

of red and yellow, green of yellow and blue, and violet of blue and red. The tint of a mixed colour depends upon the relative proportion of the elements which enter into its composition, and as there is no limit to the variations of the proportions themselves, the result is an infinite number of shades between the three primary colours.

A complementary colour, when added to a compound or simple colour, will reconstitute the

triad of elementary colours. Hence green (blue and yellow) is the complementary of red; violet (red and blue) of yellow; orange (red and yellow) of blue; and reciprocally, blue, yellow, and red are complementary to orange, violet, and green. The association of colours in twos or threes, or in a greater number, produces a very different effect upon the eye according to the combinations adopted. Certain tints mutually render each other more effective by approxima-

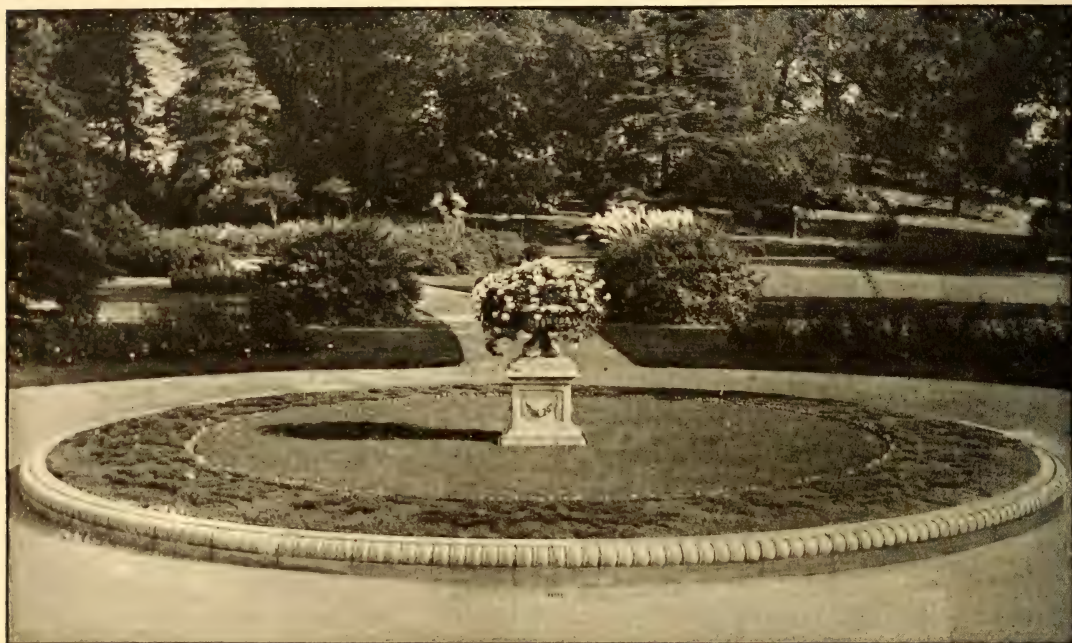


Fig. 766.—A Circular Carpet-bed at Kew.

tion, whilst others lose by association. This is sufficiently apparent from the approximation of yellow and violet, red and green, or blue and orange. Binary associations of composite colours produce pleasing results, because in each group all three elementary colours are reunited.

That the contrasts will be effective, may be proved by placing violet and orange, or violet and green, side by side. On the other hand, simple colours contrast badly with compound colours into whose composition they enter, as in this case only two of the primary colours are represented. Thus red contrasts ill with orange and with violet, and blue with violet and green. All colours are improved by association with white, and contrast with it in a most agreeable manner; white is therefore useful for separating colours that do not go well together, for instance red and orange, red and violet, violet and blue, &c.

The most suitable position for carpet-bedding

is as a rule in the immediate vicinity of the house. A position near to trees or groups of shrubs should be avoided, as the geometrical lines would be out of place amid such surroundings. The preparation of the beds and marking out of the design need to be carefully done. A fairly rich soil should be provided, which should be open and well drained. A good depth of soil is an advantage, and this should be deeply dug annually. Stiff heavy soils may be improved by adding ashes, burnt soil, or brick rubble. If it is intended to commence planting immediately after digging, tread or beat the soil so that no after-settlement may take place; or if the planting is not to be done for some time, the soil may be left to settle down naturally. The beds should be made firm and even before the plants are put in. It is advisable to mark out the whole design on the soil before any planting is done, and this is easily accomplished with fine dry white sand run into

the lines made with a pointed stick. Intricate designs, if not too large, should be cut out on stiff paper, which may then be laid on the ground and the design marked out on the soil with the dry sand. A coloured plan as a guide to the proper disposition of the plants is also helpful. Large, simple designs may be marked on the ground with the aid of lines and pegs, com-

passes 3 feet in length, a 6-feet rod, and a T-square. The planting is, as a rule, tedious work, and the neater it is done in the first instance the less labour is required to keep it in order afterwards. Broad planks supported on low stools form a bridge from which the planting of the central portions of large beds can be conveniently performed.



Fig. 767.—Carpet-bed at Aldenham House.

The following are suitable plants for carpet-bedding:—

ACHILLEA umbellata.—A dwarf compact plant of tufted habit, with silvery-white foliage; good as an edging. Propagated by division or cuttings in August.

ACHROCLINE Saundersoni.—A small plant, with silvery foliage covered with silky hairs. Propagated by cuttings in the autumn.

AGATHEA celestis variegata.—A very pleasing little plant with small variegated leaves, forming a close carpet. Propagated by cuttings in spring or autumn.

AGAVE Americana variegata.—Small plants of this are frequently used as centre-plants in carpet-bedding.

AJUGA reptans purpurea.—A purple-leaved form of the native Bugle-flower. It requires to be fully exposed to the sun, otherwise it does not colour well. Useful for dark panels. Propagated by division in spring.

ALTERNANTHERA.—Most useful of all plants for carpet-bedding; *amabilis*, strong grower, 4 to 6 inches high, has ovate purplish-green leaves changing to a brilliant orange-red; *amabilis latifolia* has broader leaves, and colour a shade brighter; *amoena* is 2 to 4 inches high, and has narrow lance-shaped leaves of a rich carmine colour; *spectabilis* is a larger-leaved and brighter-coloured form, the young leaves having a decided magenta tinge; *magnifica* has young foliage of a deep orange-red colour; *paronychioides* is a free grower, with a flush of bronze and scarlet in the young foliage; *major* has broader and brighter-coloured foliage; *major aurea* has the same habit, but with deep-yellow and red foliage, one of the showiest in favourable weather; *nana aurea* is very dwarf, with bright-yellow foliage; *versicolor* is compact, with purple and rose-coloured foliage. Propagated by cuttings in heat in spring.

ANTENNARIA tomentosa is a dwarf silvery-leaved plant which soon covers the ground with a dense white carpet scarcely an inch high. It is perfectly hardy.

CERASTIUM tomentosum is one of the best silvery-leaved plants; *arvense*, bright-green, is close-growing, and may be clipped to any extent; *Biebersteinii* is a stronger grower, with larger leaves not so silvery. They are hardy, and are readily increased by division.

COLEUS Verschaffeltii splendens is a very beautiful velvety-crimson variety of dwarf habit, and is most useful in

large designs. Propagated by cuttings in heat in early spring.

COTYLEDON (ECHEVERIA) (fig. 746).—*C. gibbiflora*, *C. bracteosa*, *C. pulverulenta*, *C. Pachyphyta*, and *C. metallica* may be used as "dots" among dark-leaved plants. For marginal lines, panels, or edgings, the smaller kinds are invaluable. *C. atropurpurea (E. sanguinea)* is a distinct plant with purplish-red narrow leaves, and is valuable as a contrast to silvery or yellow plants. *C. farinosa* is dwarf and compact, with pointed leaves of a mealy whiteness, a free grower, and well adapted for large panels or edgings. *C. glauca* is of a grayish-blue colour; *C. glauca metallica* is a more robust form; *C. Peacockii* has light glaucous-green leaves margined with red; *C. pumila* has narrow, green leaves of upright growth, and is useful for dwarf edgings; *C. secunda* and its variety *glauca* are small compact plants of glaucous or bluish-gray colour, lines or panels of the latter have quite a blue appearance. They all require protection in winter in a dry cool house or frame. Propagated by offsets.

DACTYLIS glomerata variegata.—An elegant silvery leaved, tufted, hardy grass; elegantissima surpasses it in whiteness and permanence, and elegantissima aurea, a new form with yellow leaves, is likely to become popular. They are most effective when used in combination with *Coleus*, &c. Propagated by division.

HERNIARIA glabra.—A dwarf, trailing perennial, forming a dense turf-like mass of a bright-green colour. Var. *aurea* is a golden form of it. Both indispensable for geometrical bedding on account of their neat dwarf growth. They rarely require clipping, and are perfectly hardy. Propagated by division or cuttings.

KLEINIA repens.—A dwarf succulent, with cylindrical leaves of a bluish-gray colour. *K. tomentosa* is larger and has spindle-shaped leaves densely covered with silvery tomentum. Both are well adapted for lines or small panels. Propagated by cuttings or offsets in heat.

LEUCOPHYTON Brownii (= Calcecephalus).—A thin silvery plant of branching habit, much used for carpet-bedding as it bears cutting well. Propagated by cuttings in spring.

LYSIMACHIA Nummularia aurea.—A golden form of the common Creeping-Jenny; very effective for edging or belts to borders, or for draping rockwork. Propagated by division.

MENTHA *Pulegium gibraltarium*.—A dwarf, dense-growing plant with deep-green foliage, which retains its freshness throughout the summer, and is well adapted for flat geometrical bedding. Propagated by cuttings in autumn or spring.

MESEMBRYANTHEMUM *cordifolium*.—One of the finest of variegated plants for carpet-bedding. It forms a dense carpet of fleshy, ovate, crystalline leaves, and grows freely on most soils, always looking fresh and beautiful. Propagated by cuttings in heat in spring.

NERTERA *depressa* (fig. 768).—An extremely pretty plant when studded with its tiny orange-red berries. It flourishes in the open air, only requiring slight protection in winter during very severe weather. It is best grown in pots on a shelf near the glass until its fruit is set,

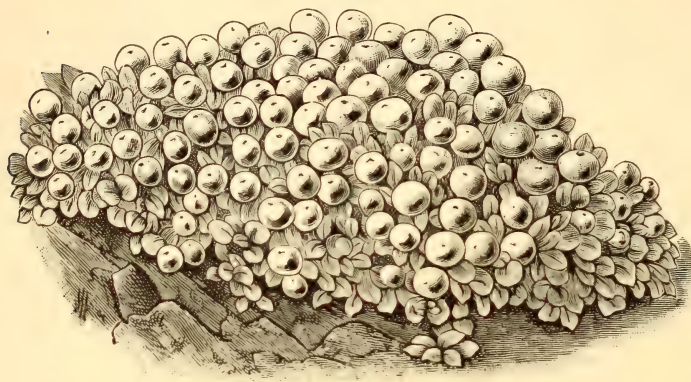


Fig. 768.—*Nertera depressa*.

when it may be plunged outside in the carpet-beds, where its bright tufts of green leaves and red berries have a pleasing effect. Propagated by division.

PACHYPHYTUM.—See *Cotyledon Pachyphyta*.

PYRETHRUM *Parthenium aureum* commonly known as Golden Feather, is one of the best and hardiest of golden-leaved plants used in carpet-bedding. A form called *laciniatum* has elegantly cut foliage; *aureum crispum* is another form with golden curly leaves; *aureum selaginoides* has leaves prettily serrated. *P. Tchihatchewii* is a deep-green plant, useful to form a carpet on dry poor soil, its creeping stems being densely clothed with finely cut or lobed foliage. Propagated by seeds sown in heat early in spring.

ROCHEA (**CRASSULA**) *falcata* is a strong-growing plant with fleshy broad glaucous leaves which are very distinct and effective. *R. perfoliata* has longer, narrower, opposite, perfoliate leaves of a paler glaucous tint. They are both useful as isolated specimens on a carpet of *Sedum* or other dwarf plant.

SANTOLINA *incana*.—A dwarf hardy plant with slender twig-like growths and knotty leaves densely covered with silvery tomentum; useful for lines or edges. Propagated by seeds or division in spring.

SAXIFRAGA.—Many of the species of the mossy section are suited for carpeting shady banks or borders in the flower-garden. Of the compact rosulate white-edged species, *S. Aizoon*, *S. Hostii*, *S. pectinata*, *S. crustata*, and *S. Sturmianii* may be recommended; whilst of the mossy group *S. densa*, *S. gemmifera*, *S. caespitosa*, *S. Thuringii*, *S. hypnoides* and its varieties, are suitable. Propagated by division.

SEDUM.—Dwarf-growing succulents, suitable for form-

ing a carpet to more prominent designs or single plants of striking habit. The following are of easy culture, and perfectly hardy in all situations. *S. Acre* and its yellow variety; *S. albicans*, deep-green, changing in hot weather to bright coral-red; *S. angelicum*, glaucous-green, suffused with yellow; it bears clipping well. *S. carneum variegatum* has yellow margins to the leaves, and may be used as an edging to such plants as *Coleus*; *S. corsicum* forms a dense, cool, grayish turf of rosette-shaped growths an inch in height; *S. glaucum* is similar to the last-named, but more blue in colour; *S. hispanicum*, also a dense-growing glaucous-green plant, is one of the prettiest for carpets; *S. farinosum* is similar to the last, but of a lighter shade of green. Propagated by division in spring.

SEMPERVIVUM (fig. 749).—Several of the Houseleeks are perfectly hardy, and are valuable for carpet-bedding; the large kinds, such as *S. arborescens* and its variegated and purple varieties, being used for mixed beds on a carpet of *Sedum* or *Saxifrage*.

S. arachnoideum is small and tufted, the rosettes covered with cobweb-like silvery hairs.

S. arenarium has small rosettes, usually of a rich crimson colour, and is lovely when planted in dense patches.

S. aureum (*Bolli*) forms a head of elegantly cupped or vasiform shape, the light-green fleshy leaves being erect. Propagated by leaf-cuttings, offsets, or division.

S. calcareum is stemless, with deep-green rosettes of leaves tipped with purplish-brown.

S. canariense forms a large rosette of fresh green spatulate leaves, 12 to 14 inches in diameter. It is useful as a dot plant or for large edgings, &c.

S. montanum is one of the neatest and prettiest, forming globular rosettes an inch across, of a deep fresh green colour.

S. tabuliforme has a short erect stem bearing a rosette of closely imbricated leaves, forming a flat table-like head a foot across. Excellent dot or central plant for panel beds.

S. triste has dull-red rosettes of leaves and is a vigorous grower.

SPERGULA *pulifera* (*Sagina glabra*).—A neat little moss-like, hardy plant, quickly forming a deep-green smooth carpet; the variety *aurea* is of a more tender character, and should be wintered in a cold frame. Propagated by division.

STELLARIA *graminea aurea*.—A dwarf golden form of the grass-leaved Chickweed, which is quite hardy, and bears clipping well. An excellent carpet-plant, very effective as a margin. Propagated by division in spring.

TEUCRIUM *polium*.—A dwarf, spreading, whitish plant, 3 inches high, very useful as a carpet or edging plant. It requires a cold frame in winter. Propagated by cuttings.

VERONICA *candida* (*incana*).—A hardy silvery-leaved plant of dwarf and dense growth, often used with good effect in carpet-bedding, especially for a large panel. Easily propagated by division in spring.

[E. B.]

CHAPTER XLIII.

THE SUBTROPICAL GARDEN.

The subtropical garden, when well done, forms a pleasing feature, and as it is not difficult to furnish if a few green-houses and frames are available, it should have a place in large gardens. The situation and aspect require to be carefully considered, sunlight and

warmth, protection from strong winds, and provision of sheltered nooks, dells, or glades being important considerations. Where these favoured conditions can be provided, the choice of plants becomes an easy task, as a greater variety of the more tender plants may be brought into use.

The ground devoted to a subtropical garden should be thoroughly drained, but if this cannot be done, it will be wise to trench the beds and borders 2 to 3 feet deep, and as the work of



Fig. 769.—Subtropical Garden at Heckfield Place, Winchfield, Hants

trenching proceeds, throw a few barrow-loads of brick rubble or clinkers into the bottom of the trench. The subtropical garden should be arranged in a tasteful manner, with due regard to the health and protection of the more tender plants employed.

Shelter is one of the most essential points in the culture of all tender large-foliaged plants in the open air; and in the case of Aroids and tree-Ferns shade and moisture are also necessary. Many plants, such as Palms, Musas, large-leaved Caladiums, and other tropical large-leaved plants, will make vigorous healthy growth if placed outside on the lawn during the summer. Exposure to a high wind will, however, ruin the growth of several years; it is therefore best, if the position is not well sheltered, to trust entirely to such plants as Canna, Ricinus, Wigandia, Ficus, Nicotiana,

Catalpa, Paulownia, Ailantus, Sumach, and Arundo, which either start into growth afresh every spring, or are treated as annuals and propagated from seeds.

The best of all stately foliage plants for terrace gardens or other elevated positions fully exposed to high winds, are Agave, Yucca, and such Palms as *Chamærops humilis*, *C. excelsa* (*Fortunei*), and *Livistona australis*. Shelter and shade can be obtained either by forming nooks and bays along the shrubbery borders, or by lowering the surface of some outlying portion of the lawn, and surrounding it with evergreen shrubs and Conifers, with the addition of silvery-leaved Willows, Planes, purple-leaved Beech, and the rapid-growing Poplars. If the beds are heavily dressed annually with well-rotted manure, they can be temporarily planted with spring-flowering bulbs and other

early-blooming plants, which will afford a glow of colour early in the year.

About the second week in June is the earliest date at which it is safe to venture on planting out *Ricinus*, *Nicotiana*, *Solanum*, *Wigandia*, *Uhdea*, and other soft-wooded plants reared annually. Robust young plants well rooted and carefully hardened off in a cool frame previous to planting out will succeed much better than larger specimens which have been drawn up in a high temperature—indeed this is a most important point in the management of large-leaved foliage plants.

The soil should be stirred as deeply as possible; the more open and friable it is the quicker and stronger will the plants make their growth, since open well-worked soils absorb heat and retain moisture much better than those which are stiff and badly cultivated. The plants require copious waterings during dry hot weather. Where large Ferns, Arads, *Dracænas*, and tender Palms are placed in shady dells, they should be sprinkled morning and evening with spray from the hose or garden engine, and if the turf is well soaked at the same time so much the better, as it will then diffuse a genial moisture during the hottest days of summer, adding to the freshness and beauty of the plants, especially the tree-Ferns, which often suffer when plunged outside from dryness in the atmosphere rather than from a lack of heat.

A few instances may serve to show the uses of the different plants employed. *Grevillea robusta*, with its light feathery drooping leaves, is very effective massed in beds carpeted with the pretty little variegated *Alyssum*. *Cordylina australis* and *C. indivisa* are particularly graceful, both being seen to great advantage in beds carpeted with variegated *Mesembryanthemum*. Large beds of *Canna*, either alone or intermingled with variegated Maize; Castor-oil plants, especially *Ricinus Gibsoni*, the coppery-brown leaves having a fine appearance, especially when massed, or mixed with variegated Maize, Tobaccos, or *Solanums* in large beds. *Melianthus major*, with its finely-cut, large, glaucous leaves tinted blue, is a favourite subtropical plant, and is highly valued for planting singly in a small bed, or grouped in beds by itself. Intermingled with the beautiful *Lobelia fulgens* and vars., or any other dark-leaved plants, it is very effective. *Wigandias* boldly grouped produce a noble effect. *Chamæpeuce diacantha* is a distinct and handsome plant, useful for edging plants with

dark foliage, such as *Canna* or *Ricinus*. *Uhdea bipinnatifida* is pretty when associated with *Cannas*, or when isolated on turf. For large beds, *Fatsia (Aralia) japonica* and *F. papyrifera* and *Caladium esculentum* are specially suitable. Several species of *Erythrina* are effective when massed in large beds, *E. crista-galli* being one of the best. The glossy-leaved *Ficus elastica* may be used either mixed with other plants or singly on the lawn. *Sonchus laciniatus* is serviceable in a similar way. Plants specially suited for isolated positions on grass, or in shady nooks or glades, are: *Alsophila excelsa*, *Blechnum brasiliense*, *Caladium esculentum*, *Caryota urens*, and *C. sobolifera*, *Cyathea dealbata*, *Dicksonia antarctica*, *Livistona (Latania) sinensis*, and *L. australis*; for an exposed position the following are preferable:—*Agave americana*, *Araucaria excelsa*, *Bocconia frutescens*, *Chamærops excelsa (Fortunei)*, *Cycas revoluta*, *Eucalyptus globulus*, *Ferdinandia eminens*, *Phoenix dactylifera*, *Seaforthia elegans*, and *Uhdea bipinnatifida*. The *Agaves* are useful for vases.

The following plants are used for subtropical gardening in the warmer parts of Great Britain:—

ABUTILON.—All the strong, erect-growing species that are sufficiently hardy may be planted out about the end of May. Among the best are Fire-King, bright-red; *Boule de Neige*, pure-white; and *Couronne d'Or*, bright-yellow. *A. Thomsoni variegata* has large-lobed leaves beautifully mottled with yellow; *A. marmoratum* and *A. vexillarium variegatum* are also good variegated forms which make fine bold masses. Propagated by cuttings in autumn.

AGAVE.—Many of the species are admirably adapted for the subtropical garden. Large plants in tubs, when plunged out-of-doors, have a fine effect. *A. americana*, the American Aloe, is largely used either alone or grouped with Palms and Ferns. Its variegated forms are also very decorative. Propagated by suckers, or from seeds.

ALBIZZIA (ACACIA) *Julibrissin* and *A. lophantha* are ornamental plants of elegant habit, with graceful Fern-like foliage, attaining a height of 5 feet in one season. They are easily raised from seed sown in heat in early spring. Cut-back specimens may be used, and will grow much higher the second year.

ALSOPHILA.—Several species, especially *A. excelsa* and *A. australis*, are sufficiently hardy to be planted or plunged in sheltered moist situations outside for the summer.

AMARANTHUS *caudatus*, 3 feet; *A. melancholicus ruber*, 1½ foot; *A. sanguineus*, 3 feet; *A. speciosus*, 4 feet; and *A. tricolor*, in great variety, about 3 feet. These are very effective, associated with *Canna*, *Solanum*, *Wigandia*, *Ricinus*, *Nicotiana*, *Aralia*, &c. Propagated by seeds sown in April.

ARAUCARIA excelsa, commonly known as the Norfolk Island Pine, may be plunged outside with other foliage plants during summer months, or as a central plant in a bed of succulents. *A. Cookii*, *A. Rulei*, *A. Goldieana*, and *A. Balance*, may be used in similar positions. They are all tender. Propagated by seeds or cuttings.

ARECA (KENTIA) sapida.—A pinnate-leaved palm which

stands exposure well. Useful as a lawn specimen. It may be wintered in an ordinary greenhouse.

ASPLENIUM Nidus.—The Bird's-nest Fern is a suitable plant for a shaded position, where it can be secured against drought. Its large Hart's-Tongue-like fronds form a nest-like rosette which in large specimens measures 6 feet or more in diameter. It should be wintered in a warm house.

BETA *Cicla variegata* (Sicilian Beet).—A strong, variable plant, with massive glossy leaf-stalks varying in colour from orange and yellow to the most brilliant purplish-crimson; very effective among other foliage plants. Propagated from seed in the spring.

BLECHNUM *brasiliense*.—This thrives in a position and with treatment similar to that recommended for *Asplenium*. Its pinnate, elegant fronds are handsome, being red when young and glossy-green when mature.

BOCCONIA *frutescens* and *B. microcarpa* are both worth a place in the subtropical garden on account of their distinct and handsome foliage. In a moist, partially-shaded position they grow to a height of 8 feet or even more. The leaves are pedately-lobed, and the flowers are borne in terminal feathery spikes. Most effective in a large group.

CANNA.—Perhaps the most useful and beautiful of all plants used in the subtropical garden. The tubers should be taken up in the autumn and stored in moist, sandy soil until the spring, when they should be looked over, divided, placed in boxes of earth, and started into growth previous to planting, as with Dahlias.

CANNABIS *sativus* (Hemp) is a quick-growing annual, 10 to 15 feet in height, with elegant lobed foliage. Suitable to form a background with other tall foliage plants. Prefers a rich sandy loam. Seeds should be sown in bottom heat in March.

CARYOTA.—Two species of this genus of Palms, viz. *C. sabelifera* and *C. urens*, may be used. They form graceful heads of fresh-green, bipinnate, drooping foliage.

CENTAUREA *gymnocarpa*, a half-shrubby Composite with finely-cut white-haired leaves, and *C. ragusina*, with bolder, less finely-cut foliage, are useful as margins for large beds of subtropical plants. Propagated from cuttings.

CHAMÉDOREA.—Several species of this genus of slender Palms, with Bamboo-like stems and elegant heads of usually pinnate leaves, are useful to mix with plants of coarser habit. *C. elatior* is perhaps the hardiest and most useful.

CHAMÉPEUCE.—These Thistle-like plants are useful for margins or for associating with plants of dwarf habit. *C. diacantha*, the Herring-bone Thistle, grows about 10 inches high, with rigid leaves in rosette-like tufts, and armed with glistening white spines. *C. Casabone* has smaller deep-green leaves, not cut at the edge, and yellow spines. Propagated by seeds in spring.

CHAMEROPS *excelsa*, or *Trachycarpus*, the Chusan Palm, is the hardiest of fan-leaved Palms, being hardy in the south of England. It is easily grown, and of such a nature as to lend itself readily to many arrangements, the leaves bearing rough usage without showing it. Also known as *C. Fortunei*.

CHENOPODIUM *Atriplicis*.—A strong-growing Chinese annual of erect habit, its slightly-branched reddish stems 3 feet in height, and the young shoots and leaves covered with purplish powder. Very ornamental and well adapted for grouping with other foliage plants. Propagated by seeds sown in spring in heat.

COLOCASIA (CALADIUM) *esculentum*.—This large-leaved Aroid is a first-rate plant for producing striking effects

both indoors and out. It has fleshy tubers and cordate shield-like leaves a yard across on stalks 3 or 4 feet high. It requires a rich, warm soil, plenty of moisture, and shelter from wind. Propagated by division.

CORDYLINE.—Popularly known as *Dracæna*. Most of those used in subtropical gardens are forms of *C. australis* (fig. 770), one of the most elegant and useful; *gracilis* is a narrow-leaved form of it, as also are *lineata*, *atropurpurea*

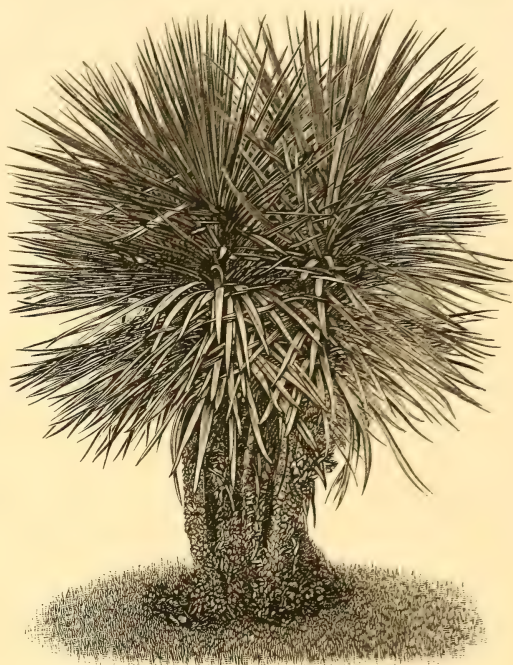


Fig. 770.—*Cordyline australis*.

Schneideri, and *Veitchii*. They are nearly hardy, thriving permanently out-of-doors in some parts of the United Kingdom.

CYATHEA *dealbata*.—A New Zealand tree-Fern with a slender stem and a crown of large fronds, dark-green above, silvery beneath. Suitable for placing outside in a sheltered corner.

CYCAS *revoluta*.—The elegant plumose rich-green leaves of this sturdy Cycad are most effective in the subtropical garden. It is suitable as the centre-piece in a bed of low-growing plants, or it may be used as a single specimen in a conspicuous place on the lawn. It likes a warm, sunny position.

DATURA (BRUGMANSIA).—These showy flowering plants are excellent when placed in a favourable position in the open air in summer, their large, pendulous, white, yellow, or crimson flowers being produced freely all through the summer. Planted in a warm, rich soil in June, young plants grow rapidly under the influence of bright sunlight and warmth. The sorts recommended are: *D. chlorantha*, flowers bright-yellow; *D. Knightii*, large glossy-green leaves, double white flowers; *D. sanguinea*, large brick-red flowers; and *D. suaveolens*, creamy-white fragrant flowers. Propagated from cuttings in spring.

DICKSONIA *antarctica*.—An Australian tree-Fern with a thick dark-brown trunk bearing a handsome head of large deeply-divided fronds. One of the hardiest and most serviceable. It requires a moist shaded situation.

ENTELEA *arborescens*.—An evergreen New Zealand shrub, 6 feet high, with large alternate heart-shaped

leaves covered with stellate down, and terminal clusters of white flowers resembling those of a small Dog-Rose. It grows about 6 feet in height, and is useful for grouping with other foliage plants. Propagated by cuttings.

ERYTHRINA.—These are very useful for massing in beds or borders. *E. crista-galli* is well known, but there are several forms of it worth using, viz.: *ornata*, *Marie Belanger*, *Madame Belanger*, *laurifolia*, *Hendersoni*, and *ruberrima*. Propagated by cuttings in heat in spring.

EUCALYPTUS globulus, the Blue-Gum, is the best, indeed the only one of the numerous species which have been introduced that has proved of any value for planting for effect in this country. It is easily raised from seeds sown in heat, forms plants 5 to 10 feet high in a season, and is

clothed to the base with long blue-green leaves. It should be planted in a sunny position. The shoots are easily damaged by wind. Plants grown in pots for a year and planted out the following June make surprising growth. They are killed by a few degrees of frost.

FARFUGIUM grande (*Senecio Kempferi*).—A Japanese herb, with thick, fleshy stalks 18 inches high, and broad, nearly heart-shaped leaves of a bright-green colour, streaked and spotted with yellow in one variety, and with white and rose in another. It likes a half-shady position and plenty of water in hot weather. Propagated by offsets in heat.

FATSIA (ARALIA).—The Chinese and Japanese ever-green species are well suited for grouping among other



Fig. 771.—*Nicotiana sylvestris*.

subtropical plants. *F. Sieboldi (japonica)* is the best, its bright-green palmately-lobed leaves on woody stems 2 to 6 feet in height being very telling either when grouped or when isolated on the lawn. *F. papyrifera*, the Chinese rice-paper plant, is of rapid growth, often attaining a height of 3 to 5 feet in one season, with leaves frequently a yard in diameter. They are densely covered with whitish wool, and are irregularly lobed. Propagated by stem or root-cuttings in spring.

FERDINANDA eminenens.—This is a quick-growing Mexican tree, but its principal use in this country is as an annual or biennial for its enormous dull-green, opposite, entire leaves. It is an excellent plant for a large mass either in a bed or as a group among other plants. In rich soil it attains a height of 6 to 8 feet in a season. Propagated by seeds in spring.

FICUS elastica grows freely when planted in a bed of rich soil in a warm, sunny position and kept well watered. It is useful for massing in beds or for select mixed groups. The variegated form is apt to burn if placed in an exposed position.

GREVILLEA robusta.—This has graceful Fern-like foliage, and is at first erect and unbranched, but branches freely when about a yard high; is very effective when grouped with dwarfier foliage plants, or massed in beds with a carpet of Sweet Alyssum. Propagated by seeds sown in heat early in spring.

HEDYCHIUM.—Sturdy Indian plants of the Ginger family, very useful for planting out in sheltered positions on warm, rich soils. *H. coronarium* has stems about 6 feet

high of Reed-like habit and large lanceolate glaucous-green foliage. When strong, the stems produce terminal clusters of white and yellow fragrant flowers. *H. Gardnerianum* is shorter, with broadly lance-shaped leaves and lemon-yellow flowers. Propagated by division in spring.

KOCHIA scoparia.—A very pleasing annual of the Goose-foot family, forming a compact bush from 3 to 5 feet high; effective for grouping with other foliage plants. Propagated by seeds in heat in spring.

LIVISTONA chinensis (Latania borbonica).—This bears exposure well if hardened gradually before being turned out; its bright-green fan-shaped leaves are always pleasing, whether grouped with other plants or as an isolated specimen. *L. australis* has the leaves more erect and the blade smaller, and may be used in the same way.

MELIA Azedarach.—A tropical tree, but known only in a small state with us. Its dark-green pinnate leaves are elegant, and its lilac-coloured fragrant flowers are produced in large bunches in the axils of the leaves. Healthy young plants put out early in June and kept to a single stem form graceful objects in the subtropical garden. The leaves are from 1½ to 2 feet long, and 1 to 1½ foot across. It prefers a rich soil in a shady position, and frequent watering. Propagated by seed in heat.

MELIANTHUS major.—An effective half-hardy scandent plant with large glaucous pinnate leaves. It is most effective when kept to about 3 feet in height, and is useful for massing with dark-leaved plants. Should be lifted in autumn and stored in a cool, dry place. Propagated from seeds.

MONSTERA deliciosa.—A stout, trailing Aroid, well known in large collections of tropical plants, its large, leathery, perforated leaves being very striking. Grown in pots or tubs and kept dwarf, it may be used for grouping with other plants in the subtropical garden, where, however, it must be regularly watered. Few plants possess nobler foliage. Propagated by cuttings.

MONTAGNEA heracleifolia (Polymnia grandis).—A handsome shrub with large opposite, much-divided, and elegantly-lobed leaves 2 to 3 feet long. The stem and leaf-stalks are spotted with white, and the leaves when young are covered with a soft white down. Valuable for isolating in sheltered positions on lawns. Propagated by root-cuttings in autumn or stem-cuttings in spring.

MUSA Ensete.—One of the noblest of all subtropical plants, with enormous pale-green red-ribbed leaves 6 to 12 feet long, and growing very freely when plunged outside in sheltered positions during the summer. If possible a sheltered bay should be provided for this and other large-leaved plants, to prevent them being torn by the wind. *M. superba* also grows well on warm rich soils in sheltered places. Propagated by seeds.

NICOTIANA.—The Tobacco plants are excellent for subtropical beds and groups. The most striking are:—*N. tomentosa (colossea)*, which grows 3 to 5 feet high in a season, and has very large sturdy leaves. Under glass it grows 12 feet high. *N. wigandioides*, with Wigandia-like foliage, 6 feet. *N. sylvestris* (fig. 771), a sturdy species with bright-green leaves and pyramidal racemes of large white flowers, like some of the forms of *N. Tabacum*. *N. affinis*, with large white, fragrant flowers, is extensively grown. A variegated form of it with silvery-edged leaves is also worth a place. Propagated by seeds sown in heat in early spring.

PHENIX dactylifera.—The Date-Palm, although of somewhat ragged appearance, is suitable, its hardness and glaucous-green colour being useful characters. *P. canariensis* is a noble species with rich-green fronds like enormous ostrich-plumes; *P. senegalensis* is said to be hardy in some parts of England.

PHORMIUM tenax (New Zealand Flax) is hardy in the south-western parts of England. Its erect, sword-shaped leaves are most effective among large-leaved plants. There are several forms, including a variegated one. Propagated by division.

RICHARDIA africana (Calla aethiopica) may be planted in groups in the open ground for the summer, and if liberally supplied with water it grows and flowers freely.

RICINUS (Castor-oil).—In deep, rich soil, this grows rapidly—as much as 10 feet in some seasons. There are numerous forms of it, the best-known being sanguineus, blood-red; borbonensis, purple; giganteus, purple; Gibsoni, dark-purple, dwarf; africanus, green; macrocarpus, white stems, light-green leaves. Propagated by seeds in heat in early spring.

SACCHARUM aegyptiacum.—A tall, vigorous, perennial grass forming large tufts of Reed-like downy stems 6 to 10 feet high, and clothed with graceful foliage, well adapted for plunging with foliage plants on lawns or by the margins of pieces of water. Propagated by division in spring.

SEAFORTHIA elegans.—An elegant, pinnate-leaved Palm useful for plunging as an isolated specimen in the sheltered portions of the pleasure-grounds on account of its graceful beauty and hardy constitution.

SENECIO grandifolius (Ghiesbreghtii).—A thick-stemmed, large-leaved Mexican species, which attains a height of 3 to 5 feet in deep rich soils in a single season. In the

autumn, strong plants develop a large corymbose cluster of yellow flowers. Useful for isolating on grass, or for beds.

S. laciniatus is an elegant plant with slender green, finely-cut foliage. It should not be allowed to flower. Propagated by root- or stem-cuttings, or from seed in heat.

SOLANUM.—Many species of this large genus are handsome foliage plants eminently fitted for subtropical gardening. All propagated by seeds in heat in February, or by cuttings. The following are among the most suitable:—

S. callicarpum. Robust, 5 feet high, covered with hairs interspersed with spines, and of a variable grayish-violet hue; the broad, angular, heart-shaped leaves about 2 feet long.

S. erinitum. A strong grower, 5 feet high, with stout stems set with short spines and dense long hairs, whilst the roundish, green, purple-veined leaves are 2 feet in length.

S. giganteum. Large-leaved, about 3 feet high, the under side of the leaves white and downy; a noble plant when isolated on shaded lawns.

S. hyporhodium. Stem stout, about 5 feet high, branches armed with short spines; leaves 2 feet long, oval, with angular lobes, green with white veins, the under side violet-red and downy.

S. laciniatum. A strong grower, 3 to 4 feet high, the erect, slightly-branching stems clothed with boldly-cut foliage of a deep-green colour.

S. macranthum. Robust, about 5 feet high, clothed with large-lobed pendent leaves of a pale-green colour



Fig. 772.—*Solanum robustum*.

with purple-red veins, the under surface reddish. A most effective plant in warm, sheltered positions.

S. marginatum. A bushy plant 2 to 3 feet high, the oblong, sinuate leaves deep-green covered with silvery tomentum, which is so thick near the edge as to form a white border.

S. robustum (fig. 772). 3 to 4 feet high, with large leaves nearly 2 feet long, of a soft-brown colour above,

the midrib and lateral veins being set with strong hooked spines.

S. Sieglingii. Large and handsome, the foliage light-green tinged with rose and sparsely armed with spines. A good sort which has been little tried in England. The old plants, if saved, will in a year or two form specimens 12 feet high.

S. Warszewiczii. Moderately robust, branching from the base, the spinose stems clothed with lobed deep-green leaves, the leaf-stalks and young branches tinged with red.

SONCHUS laciniatus.—A graceful plant with large deeply-cut leaves and yellow flower-heads. Best when grouped on grass or open spaces, its elegant foliage being then seen to the best advantage. It prefers a rich soil and a sunny position. Propagated by seeds in heat.

SPARMANNIA africana.—A handsome shrub, resembling a *Malva*, with long-stalked, heart-shaped leaves clothed with soft down; its pretty white flowers are produced in erect clusters. It thrives in the open air in summer on a light rich soil. Propagated by cuttings in heat.

TUPIDANTHUS calyptratus.—An *Aralia*-like plant, hardy in the open air from June till October. The leaves are large, deeply divided, and of a dark shining-green colour; it grows from 6 feet or more high, and should have stove treatment in winter and spring. Suitable for grouping in beds or as an isolated specimen.

UHDEA (MONTANOA) bipinnatifida.—A stout Mexican Composite, invaluable for summer decoration. It is of robust growth, attains a height of 4 to 6 feet, with glaucous, deeply-cut foliage. Best in a sheltered position on the lawn, or when grouped along with dark-leaved *Canna* or *Ricinus*. Propagated by cuttings in spring.



Fig. 773.—*Wigandia caracasana*.

VERBESINA gigantea.—A shrub about 6 feet high, with stout stems and large, winged, pinnate leaves of a delicate-green colour. Suitable for beds or groups. Propagated by division of roots, or by seeds in heat.

WIGANDIA caracasana (fig. 773) is sufficiently hardy to make a luxuriant growth 3 to 5 feet high in one sea-

son in deep rich soils. The leaves are ovate, 2 feet long, and wavy. *W. Vigieri* is even more vigorous and quick; it is distinguished from the former by its longer, more hairy leaves. Propagated by seeds in heat in spring, or by root-cuttings.

WOODWARDIA radicans may be used in a shady, moist corner in the subtropical garden, where, if planted on the top of a stump or small mound, its beautiful arching fronds are very effective.

XANTHOSOMA robustum.—Of similar habit and appearance to *Caladium esculentum*, requires the same kind of position and treatment. *X. violaceum* has the leaf-stalks, and to some extent the blades also, coloured dark-purple.

ZEa.—The well-known Maize or Indian-corn is useful in many ways. There are two well-marked forms, the green and variegated, as well as many others whose differences are mainly in their seeds. Planted in good soil in a sunny position and kept watered, they grow 3 to 7 feet high. Propagated by seeds in spring in heat.

[E. B.]

CHAPTER XLIV.

WINTER BEDDING.

Winter bedding should be confined chiefly to those beds in the more conspicuous parts of the garden, which, as a rule, are immediately contiguous to the mansion, and are to be seen from the front and windows. The plants employed must of necessity be mostly small, hardy ever-green trees and shrubs, although some ever-green herbaceous plants may also be made to serve, such as, for instance, the big-leaved *Saxifragas*, *Sedums*, and *Wallflowers*. Form and colour of foliage, as well as habit, are important considerations. The plants must either be prepared in the nursery garden, or, if this is not convenient, they may as a rule be purchased fairly cheaply from those who make their cultivation a speciality. A stock of useful little plants could be worked up in a year or two from seeds and cuttings, if a reserve plot for their accommodation were provided. Information as to their habit of growth and cultural directions for them will be found in the chapters devoted specially to hardy trees and shrubs.

ARAUCARIA imbricata.—Small plants in pots or tubs are suitable for groups or to take the place of specimen *Fuchsias*, &c., on the lawn.

AUCUBA japonica.—One of the most serviceable in all its forms, both on account of leaf-variegation and for the bright-red berries of the female variety. Large bushes are good for open places on the lawn. Small plants may be transplanted easily into beds for the winter.

BIOTA.—Small plants are shapely pyramids and transplant easily. Some of the best forms are *aurea*, *argentea*, and *elegantissima*.

BUXUS.—The common Box and its varieties, especially *nana variegata*, *argentea*, *aurea*, and *japonica aurea*, are well suited for this purpose.

CORNUS.—The Dogwoods afford two useful plants for winter effect, viz. *C. sanguinea*, a bush with Willow-like stems of a bright-red colour, and *C. atrosanguinea*, with stems of a darker crimson colour. Planted in beds with Eranthis, Crocus, or Snowdrop, the colour of the stems is accentuated by the flowers. The stems should be cut back every year just before they begin to break.

CRATÆGUS *Pyracantha*.—Small plants grown in pots and covered with their clusters of rich-red berries may be used in a variety of ways. The variety *Lalandii* is best for this purpose.

CRYPTOMERIA *japonica elegans*.—Very elegant and graceful; the variety *nana* is perhaps the best for winter-bedding.

CUPRESSUS.—Young plants of any species are suitable. There are some golden and variegated varieties of *C. Lawsoniana*, such as *erecta viridis*, *Fraseri*, *lutea*, and *nana glauca*, which show up brightly in winter.

ERICA.—The hardy Heaths make neat winter-bedding plants. Those which flower in winter are *E. herbacea carnea*, with bright flesh-coloured flowers; *E. mediterranea* and its varieties *alba*, *carnea*, *glauca*, *nana*, *stricta*, and *rubra*; *E. vulgaris aurea*, with golden foliage, is useful for edging.

EUONYMUS.—*E. japonicus* and its varieties *argentea variegatus* and *aurea variegatus*, make shapely little shrubs, whilst *E. radicans* and its variegated form are most effective as edging plants.

GAULTHERIA *procumbens*, a neat little evergreen shrub 4 to 6 inches in height, with bright-coloured berries, is most useful for edging.

HEDERA.—The Ivy affords so much variety in form and colour that a whole series of beds might be furnished with it alone. The shapely little bushes formed by the "tree" Ivies, some of which are richly variegated, and such of the creeping sorts as can easily be made to assume a convenient shape with the aid of a stake, are specially recommended.

ILEX.—The Hollies afford much variety in form and colour of leaf, whilst small plants of free-fruited varieties may be used with good results. Some of the best are *ferox*, *foliis argenteis*, *flavum* (yellow-berried), *Golden Queen*, *Silver Queen*, *Shepherdii*, *Madeirensis variegata*, and *aurea picta* (Golden Milkmaid). There are some good weeping varieties, including *Handsworthensis pendula*.

JUNIPERUS.—All the hardy Junipers are well adapted for winter-bedding. Some of the best are *J. Sabina variegata*, *J. chinensis aurea*, and *J. chinensis albo variegata*.

LIGUSTRUM.—The Privets may be largely used if easily-grown plants only can be afforded. The large and small-leaved sorts, the golden and the variegated, are among the most serviceable of plants grown for winter effect.

OSMANTHUS *ilicifolius*.—This handsome Holly-like plant with dark-green shiny leaves, and its purple-leaved variety, are worth using in those parts of the country where they are hardy.

PERNETTYA *mucronata*.—There are many forms of this hardy dwarf evergreen shrub, with small dark-green rigid leaves, the berries of which in winter are most attractive, being very abundant in clusters all over the branches, and coloured white, pink, lilac, purple, and crimson. Birds steal the berries in frosty weather.

PICEA (ABIES) *excelsa*.—The dwarf varieties of Spruce, especially *clanbrasiliana* and *conica*, from 2 to 3 feet high; *elegans*, *Finlandensis* (variegated), and *pumila*, 3 to 6 feet high.

PIERIS (ANDROMEDA).—Valuable for their flowers, pro-

duced in winter and early spring, especially *P. floribunda* and *P. japonica*. These make good permanent beds.

RETINOSPORA.—The variegated kinds are very ornamental, especially young plants of the following: *R. pisifera*, and var. *aurea*; *R. plumosa*, and vars. *argentea* and *aurea*; and *R. squarrosa*—these will bear clipping to almost any extent.

SALIX (Willow).—Some of the Willows are recommended for the bright colour of their leafless stems in winter; they are: *S. atropurpurea*, dark-purple, *S. purpurea*, red-purple, and *S. aurea*, yellow; most effective near water.

SKIMMIA *japonica* and *S. oblata* (*Veitchii*) are dwarf evergreens with large scarlet berries in clusters.

SPIRÆA *Douglasii*.—The young bronzy twigs of this little shrub form a very pleasing contrast in the winter. They should be cut back every spring to within a foot of the ground.

TAXUS (Yew).—There are several varieties of both the common and Irish Yews which are well suited for winter-bedding. Small plants of these may be used to fill beds either alone or in combination with other plants.

THUJA.—All the forms of *T. occidentalis* are very well adapted for grouping with other evergreen trees and shrubs in winter beds.

THUJOPSIS.—Small plants of *T. borealis*, *T. dolobrata nana*, and var. *variegata*, are especially serviceable in winter-bedding.

VERONICA.—In the warmer parts of the country the New Zealand Veronics may be employed as winter-borders. They comprise considerable variety of habit and foliage, are evergreen, and they bear transplanting well.

VIBURNUM.—The Laurustinus may be used both for its leaves and flowers. Small plants, if grown in pots, flower freely.

VINCA *major*.—The Periwinkle, both green and variegated, is a very useful plant for winter effects, being suitable for edging, or as a carpet to spring-flowering bulbs, &c. It thrives under trees.

[E. B.]

CHAPTER XLV.

FLORAL DECORATIONS.

The term Floral Decorations is popularly applied to the use of portions of plants, such as leaves, flowers, and fruits, for ornamental purposes. The subject may be conveniently treated under the three following heads:—

Personal Decorations.—This includes all those floral ornaments worn or used by ladies, such as hand-bouquets, breast or dress bouquets or sprays, wreaths, coronets, and sprays for the hair, &c.; and by gentlemen, in the form of button-hole bouquets.

Domestic Decorations.—This is a wide field, and embraces the ornamentation of vestibules, halls, &c.; of tables, dinner and others; of walls, side-boards, doorways, windows, and other parts of the house.

Preparation of Material.—Consideration should

in the first place be given to the gathering and preparation of the material to be used. If the decorator is at liberty to go into the garden and greenhouses, and cut what he chooses, he can select flowers and foliage that will look best in the vases which he is required to fill. But if the material is supplied to him, then he ought to be allowed to choose the vases that are most suitable. Nothing spoils the effect of floral arrangements so easily as

the use of the wrong kind of vases, and many a gardener or decorator has been blamed for results over which he had no control, because of the restrictions and limitations under which he worked.

Flowers should be used as soon as possible after they have been cut. Or perhaps it would be better to say, that flowers should not be cut until they are wanted, though this latter assertion may often need considerable modification.



Fig. 774.—Iceland Poppies in a Bowl.

In wet or gloomy weather, flowers may be gathered at any hour; but when it is hot and dry, they ought to be cut in the early morning whilst the dew is still fresh upon them. Roses never look so beautiful, or keep so well, as when cut early. In the event of the flowers not being required before the evening, they should be put into water as soon as possible, and be kept in a cool, moist cellar or shed. It is also much better to keep them in several small vessels, rather than crowded together in one large vessel.

Although some flowers require no further preparation than the removal of such portions as will not be either ornamental or useful in the arrangement for which they are destined, yet there are many, and these principally of a delicate character, which need preparation.

The necessary tools for a flower-worker are gum, wires, a strong pair of short-bladed sharp-pointed scissors, and a good knife.

Gum.—The best is that made by dissolving finely pounded white shell-lac in spirits of wine, put into a large jar, and frequently shaking it up until it is all dissolved; its solution is expedited by keeping it in a warm place. When made, it should be of the consistency of cream; and it should be kept well corked in a cool place, a little being taken out occasionally as wanted. The most convenient method of using it is to pass a brass-wire (gauge 21) through the centre of the cork of a strong vial about 3 inches high by $1\frac{1}{2}$ inch diameter, which should have a moderately wide mouth, and be filled about half-full; if the cork is greased before putting it in, it will be less likely to stick fast. The

wire should reach nearly to the bottom of the bottle. Or a long-spouted oil-can may be employed with greater facility, inserting the point to where the gum is needed before pressing the button for the drop to escape.

Gum may be applied either outside or inside the flower. Flowers with separate petals, like Pelargoniums, only require a single drop in the centre of each flower. Flowers with a tubular corolla, like the Jasmines, must be gummed at the base of the tube outside. With large delicate flowers, such as Azaleas, it is desirable to gum them both outside and inside; or else to gum them inside twice, the second application being made after the first is quite dry.

Wires.—Professional florists use at least three kinds of iron wires. Iron is much the cheapest, but it has the drawback of soiling with rust the insides of glass and other vases; and this rust is not easily removable without using some strong acid. Stubbs of soft-iron wire, gauge 21, cut into convenient lengths, usually 6 to 15 inches long, are used for artificial stalks to flowers that have short stalks or none at all; or to give support to flowers and leaves that are liable to droop, or otherwise get out of position. Binding wire is fine and hair-like: it is convenient to keep this cut into lengths of 8 and 16 inches; its name explains its most ordinary use. "Camellia wire" is a hardened iron wire, bright like steel, and rather larger than the last, being gauge 25. It is kept in 8-inch lengths, and is used only for Camellias and other large flowers. In addition to these, it is desirable to have at hand some still stronger soft-iron wire, gauges 11 and 16, or thereabouts; and also some of the finest thread-like wire on a reel, for binding very small or very delicate flowers.

Wire should be used only when it is necessary. Flowers whose stalks are too thick to be used must have the latter removed and wire substituted. The wire should be fastened on firmly, even if it be necessary to hook it through the base of the flower. If wire is added to enable the operator to fix the flower in any position, then it should be twisted a few times round the stalk. The work must be done intelligently and neatly.

For Camellia flowers only the fine hardened iron wire should be used. These flowers need care in handling, since their petals are easily bruised or cracked, and the slightest injury causes a brown mark, which spoils their beauty. Camellias would be much more easily handled

if they were cut with a few inches of stem to each; but this is rarely done. The flowers generally come into the hands of the florist without stalks, and a stalk must be provided. This is done by passing two or three wire stubbs through the petals at the base, and then twisting them together; for some purposes it is desirable to attach them to a piece of hazel or other twig. Roses may be treated in the same way.

Bouvardias, Jasmines, Primulas, and many other small flowers, may be secured by passing down through the centre of each a fine wire, the other end of which has been hooked or curved into a small semicircle; when you feel this hook catching firmly into the flower, out of sight, then twist the other end round, or bind it to the stalk of the flower. A pair of small round-nosed pliers will be found useful, as a ready means of quickly hooking the ends of the wires, when a number are likely to be wanted.

All flowers should be arranged with their natural pose. It is not unusual to see Orchid flowers arranged upside down by a florist who is not acquainted with their habit of growth. If it be borne in mind that all Orchid flowers have their lips at the base, such a mistake cannot be made.

PERSONAL DECORATIONS.

Hand-bouquet.—This is usually considered to be a very simple and easy thing to make; and so it is to those who have been taught how to do it properly; while those who, fancying it a thing that anybody with taste can do, try for the first time to tie up a presentable nosegay, will very likely find that the flowers won't go where they are wanted, or won't stay in their places when put there.

Anyone can go into a well-furnished garden or conservatory and cut a nosegay, and many are able to arrange the flowers as they cut them, with the colours nicely harmonized or contrasted, and the blossoms relieved and set off with a proper proportion of foliage. But such a nosegay will present the following shortcomings: it will be clumsy and uncomfortable to hold; it will keep fresh but a very short time in the hand; and the blooms are certain to be crowded and squeezed together. On the other hand, in a properly made bouquet the flowers are not crowded, they keep fresh for many hours without flagging, and they are easily held by a small hand.

Like all other floral arrangements, the best bouquets are those which present the most pleasing combinations of the smallest quantity of materials, without carrying out the theory to the extent of poverty. Some are under the impression that the more flowers it contains the better the quality of the bouquet. Whereas the qualifications in a hand-bouquet are, that it should be small to grasp, light to carry, pleasing (and not glaring) to the eye, grateful (and not sickly) to the nose, graceful and elegant (not crowded) in its arrangement, and composed of flowers and leaves that will keep fresh for at least six hours when exposed to the dry atmosphere of a hot room.

Much time will be saved in bouquet-making, as in most other branches of art, by thinking beforehand. The size of the bouquet being determined, the number and grouping of the flowers must be thought of, and just that number, with one or two over, of each kind must be wired and mossed, and put into tall jars of water. These jars should then be put away in a cool cupboard until all other preparations are completed. In like manner the Fern fronds or other foliage should be prepared and put into water until wanted.

When everything is ready, take a stick a foot long and bind about one end a pad of moss, making it like a drum-stick. As many of the wired-stalks as possible should be drawn through this moss, which, when damp, serves to keep the bouquet fresh. Should more moss be seen between the flowers than is desirable, it can easily be hidden by sticking in small fronds of Fern that have been wired. Proceeding in this way to add and bind together foliage and flowers until the bouquet is of the intended size, a fringe of delicate Fern fronds should form the edging. To these used to be added lace, perforated paper, satin bows and ends, &c., "at discretion". Now, thanks to the greater taste of our floral decorators, these accessories are rarely seen, except ribbon, the colour of which should be in harmony with the prevailing tint of the flowers used, and preferably lighter in colour. The stem of the bouquet should be firmly fixed in a wicker or metal holder, to prevent the glove being soiled. A useful stand for a bouquet when not in use is shown at fig. 775.

The old-fashioned round-topped bouquets have almost, if not quite, gone out of favour, and we have what is familiarly known as the "shower" bouquet and the "posy". Some hesitate to adopt these forms, because they are supposed to be difficult to construct; with a

little practice, however, they will be found to be easier, and they are great improvements on the old shapes. It is now possible to employ sprays of Orchids, and other flowers too, in quite a natural manner and with far less wiring than formerly.

In order to make a shower bouquet in the easiest possible way, the long drooping foliage and flowers for the front should be first arranged, the finest being at the back; so that the bouquet, when finished, is more or less a one-sided arrangement of flowers and leaves. A posy is made the reverse way, bearing in mind, however, that in this instance the flowers are chosen in the same order; for in a posy the spray-like flowers are the farthest from the handle, whereas in the shower bouquet they are the nearest to it. For ordinary purposes the posy is better than the shower bouquet, as it can be laid down without damage. Small loose sprays of flowers are now largely used by ladies at dinner-parties in preference to bouquets.

Bouquet-makers in London use square boxes made of thin deal, in which they tightly pack



Fig. 775.—Bouquet Stand.

the lower part (or handle) of the bouquet with paper shavings, obtained from the stationers. The floral part is surrounded and thickly covered with soft paper and sheets of cotton wadding; and if this is not enough to fill the box, more paper shavings are added until it is

quite full. Bouquets packed in this way are daily sent many hundreds of miles, and arrive safely and fit for use two days afterwards. This is found to be the most practical mode of transit. The handle of each bouquet should be secured to the box.

Button-hole Bouquets.—These consist of such flowers as a Rosebud, Gardenia, Picotee, or any other single flower, arranged with its own foliage or with Fern fronds. A combination of several kinds of flowers is rarely used. For keeping them fresh whilst they are being worn the best plan is to put them into a glass or metal tube suspended from the button-hole behind the fold of the coat; these are supplied by florists for the purpose. (See fig. 776.)

Floral Head-dresses.—These consist of either wreaths, coronets, sprays, or single flowers. A wreath goes all round the head; a coronet is worn on the top of the head in front; a spray is worn on the side of the head; and if it is long enough to hang down below the ear, the spray is called a droop. Single flowers, or a raceme, such as a spike of *Odontoglossum*, may be put into a small tube of water, the tube being concealed in the hair. All such floral decorations should be made up as expeditiously as possible, sprinkled by means of a vaporizer, and after being shaken gently, should be put away in a cool, moist place until they are required for use.

Head-wreaths look best when made of flowers of uniform medium size. For coronets it is usual to place the largest flower in or near the middle, and smaller flowers towards each end. For a spray the largest flower should be at the front, with smaller flowers farther back; if it is to terminate in a droop, that should be made of some light dependent flower, or of foliage only, such as *Asparagus*. Flowers to be worn upon the dress are known as shoulder and breast sprays, the former having the larger flowers at one end, and the latter in the middle. When flowers are to be worn upon the dress as a drapery only,

light ones should be chosen. With these, some light sprays of *Asparagus* or *Myrsiphyllum* will be appropriate.

In selecting flowers for the hair, preference should be given to those with petals of good substance, which usually retain their freshness for at least six hours. Such are Camellias, Roses, *Stephanotis*, Orchids generally, *Kalanthes*, Hyacinths, double *Pelargoniums*, Lilies, *Lapageria*, Malayan *Rhododendrons*, *Eucharis*, *Narcissus*, Lily of the Valley, *Agapanthus*, &c.

Fronds of such Ferns as *Gleichenia*, *Davallia*, and *Adiantum* may be used for foliage, selecting only those fronds that are matured. Equally serviceable and in every way suitable are the several species of *Asparagus*.

DOMESTIC DECORATIONS.

Vases.—If vases are intended to be decorative when they have no flowers in them, there is endless variety to choose from. Generally, however, flowers look better in glass than in vases made of any other material.

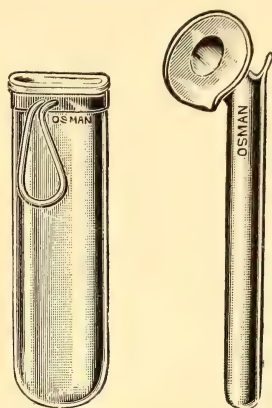


Fig. 776.—Button-hole Bouquet-tubes.



Fig. 777.—Cazenove Flower Rack.

A useful aid to keeping flowers loose in arrangement and in a natural position is the Cazenove Flower Rack (fig. 777).

When vases are required for special purposes, the subject of proportion becomes important. By this is intended, not only proportion in the different parts of the vase, so that its outline may be pleasing to the eye when not furnished with flowers, but also proportion in reference to the size of the table upon which it is to be

used, and to the size of the other objects which are to occupy the same table. There are some forms of vases that look well in a drawing-room

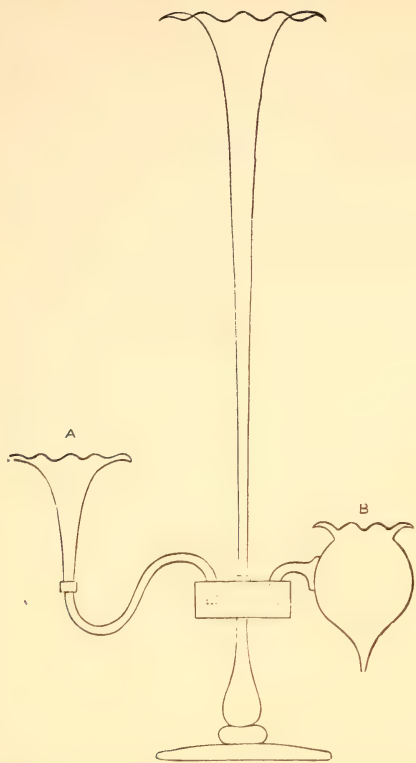


Fig. 778.—Sectional view of a Convertible Dinner-table Vase.

which are quite unsuitable for a dining-table; while of the many beautiful forms of dinner-table vases now to be met with, there is probably not one that would be out of place in a drawing-room or a boudoir, provided that the table upon which it is to be placed is of appropriate size and that the surroundings are suitable.

The annexed engravings (figs. 778, 779) represent a useful form of vase for many purposes, and for most kinds of flowers. The pedestal is 5 inches high, and its foot is 5 inches in diameter. Into this pedestal is screwed a trumpet-vase 17 inches high and 5 inches across the top; thus making the whole height of the vase 22 inches. Upon the upper part of the pedestal rests a thick glass collar containing six holes, into any of which can be placed the two kinds of branches indicated as A and B, of which three of each are provided. The top of the branch-vase A is 9 inches above the table, and the lowest part of its supporting arm descends to $3\frac{1}{2}$ inches from the table; its rim is $3\frac{1}{2}$ inches across, and its edge is $3\frac{1}{2}$ inches

from the central stem. The top of the branch-vase B is 7 inches, and its lowest point is $2\frac{1}{2}$ inches above the table; its rim is 3 inches across, and its edge is 2 inches from the central stem.

The diagram shows the two sets of three branch-vases arranged alternately; but from the nozzles of the branches being all of one size, this arrangement admits of various modifications, depending upon the place where the vase when furnished is to be used, and the kind of flowers it will contain. For the centre of a table three or six branches may be used, or it may be used without any branches, and the foot might then stand in a soup-plate or other round dish. If three branches be used, they must all be of one form. But if it is to stand on a side-board, where it only requires to be "dressed to one face", there is then the option of employing either six, five, three, or two branches at one time. If wanted for a mantel-piece, it would probably be found best to use one of B between two of A, which would bring the three branch-vases nearly in a straight line. For a still narrower shelf a pair of either A or B placed opposite to each other would be found to be the best arrangement.

Other forms of flower-stands are shown at figs. 780-783.

Arrangements of Flowers in Vases.—Beautiful groupings of flowers are easily made by persons possessed of good taste and experience, and who therefore have a great advantage over others who have not paid any attention to the

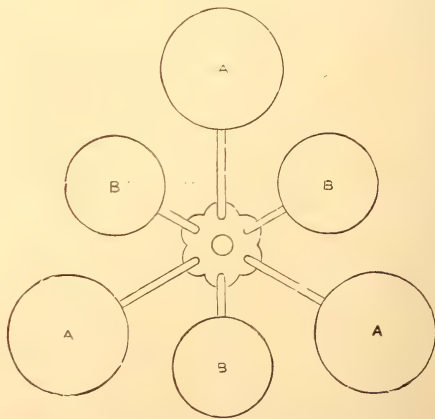


Fig. 779.—Diagram showing mode of arranging the Branch Vases.

subject. To the latter a few general directions may prove useful.

Supposing, for convenience of illustration, that the flowers are to be arranged in an Exhibition Vase (that is, with a dish at the foot, a

dish half-way up, and a trumpet at the top), the flowers should first be assorted according to their sizes, the largest for the bottom dish, the lightest at the top, and those of medium size



Fig. 780.—Jasper Flower-holders.

in the middle dish. While this rule is an important one generally, it must not be too stringently adhered to; a few light flowers amongst the heavy ones at the base of a vase

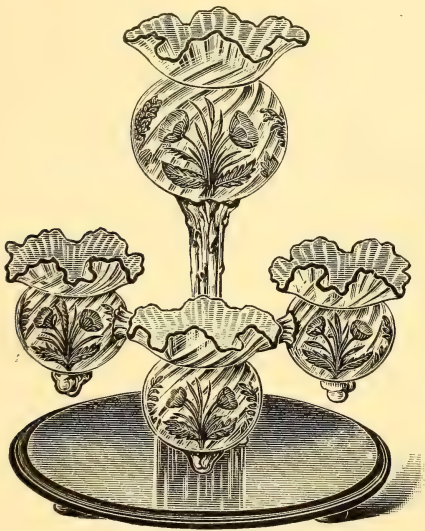


Fig. 781.—Epergne.

being often a great improvement, while one or two flowers of medium size amongst the light ones help to give character and force to the top of a vase.

Next, the flowers should be assorted according to their colours, and those which will not group well with the majority of the flowers should be put aside. The darkest shades should be used

below, and the lightest in the top of the vase. It often happens that shade of colour is of more consequence than size of flower, and that small flowers of a dark shade, placed in bold masses at the bottom of a vase, look well under larger

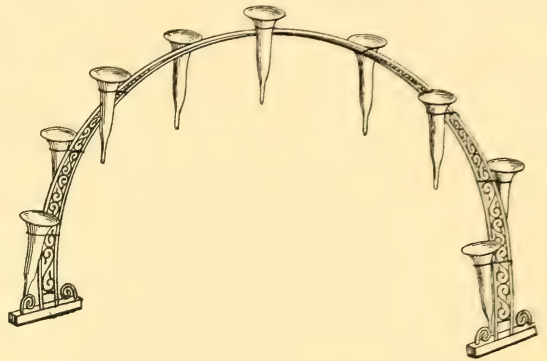


Fig. 782.—Arcadian Arch.

flowers of a paler shade placed higher up in the arrangement.

Another point to be remembered is, that flowers of a similar form group together much better than when two or more forms are mixed, as in fig. 784. In this the base is furnished with fronds of various Ferns and stems of *Cissus discolor*. Amongst these are flowers of *Eucharis*, *Rochea coccinea*, and *Allamanda*. The middle dish contains *Vallota*, white *Dipladenia*, and *Stephanotis*, mixed with and fringed by *Adiantum* and *Davallia*. In the top are red and white *Bouvardia*, mixed with grass, and fringed with drooping pieces of *Myrsiphyllum*. It will be seen that the sizes of the flowers and



Fig. 783.—Bamboo Stand.

foliage diminish from the bottom to the top, and that only one colour (red) is used besides white (the pale-yellow *Allamanda* looking nearly white by artificial light); also that the deep-red of the *Rochea* comes below the paler *Vallota*, although the blossoms of the latter are larger; the delicate-red of the *Bouvardia* appropriately carries the colour to the top of the

arrangement. Mixed with the latter is white Bouvardia, repeated in the next dish with Stephanotis and white Dipladenia.

In many establishments it is now usual to arrange the flowers on the dinner-table in low bowls or vases, so that the guests when seated at the table are able to see each other over the



Fig. 784.—Arrangement of Tubular Flowers.

flowers and converse without inconvenience. This is infinitely better than a cumbrous heavy design that obstructs the view. At flower-shows it is a common practice to offer prizes for "the best examples of floral decoration for a dinner-table", but as a rule the exhibits are quite unfit for the purpose intended, being either too dense or too uniform in the size of the stands used. The colours should, of course, agree, and the central stand of three should contain the larger flowers. Two low stands or vases, with one taller one for a centre, make a better arrangement than three of similar size. Many prefer their tables decorated with one kind and variety of flower only; for example, La France Rose or Souvenir de la Malmaison Carnation. In either case the central vase or bowl should contain the largest flowers, and

be so arranged as to be the prominent feature. In no case is it advisable to have more than two kinds or colours of flowers in one arrangement of several vases.

Flowers in Baskets or Vases.—When this mode of arrangement is selected for purposes of house decoration, there should be tins fitted to the baskets, both for the better preservation of the flowers, and also as a safeguard against injury to furniture of any kind. For the drawing-room table a tastefully arranged basket is most effective; unless the arrangement be of the very best, mixed flowers are less effective than baskets or vases of one kind only (fig. 785); such as, for instance, Roses, Chrysanthemums, Daffodils, Cattleyas; the aim being to give an individuality to each basket. Light climbers entwined around the handles add to the effect. Unless for a presentation basket the use of ribbons is undesirable, and even if for that purpose ribbons are somewhat doubtful additions, the tendency being to overdo such accessories.

Decoration of Dinner-tables.—In order to secure a pleasing effect it is important that the flower vases should be suitable in size and form. If too large, a heavy effect will result, and if too small the arrangement will appear poor, no matter how well the flowers are put in. Decorations that are not higher than 15 inches above the table will not interrupt the view; and when tall vases or small standard plants are used, there must be nothing in the upper part of them which hangs lower than 20 inches from the table. The slender stems of the plants and of tall glass vases, if not more than two or three are used, may be entwined with some light and elegant creeper, and not be objectionable to those seated at the table.

At dinner parties which do not exceed sixteen in number it is advisable to have only one well-arranged large vase placed in the centre of the table, and to make every other ornament upon the table (whether floral or otherwise) subordinate to that central vase. If the table should be so long as to require three principal ornaments, it is better to use a pair of elegant Palms or other plants with finely-divided foliage, one at each end.

Arrangement of Fruit in Dishes.—There is no form of vase or dish in which fruit looks better than a glass basket, with or without a handle, and decorated with the leaves of its own kind. For fruits generally no leaves are more suitable or prettier than those of the Vine, the Maples, or the Sycamore, selecting them in proportion



Fig. 785.—Basket of Flowers.

Cattleya, Acacia, and Lilac flowers. Palm, Galax, and Asparagus leaves. (Arranged by Standish & Co., Court Florists, St. George's Place, S.W.)



Fig. 786.—Cross and Wreath.

Cross entirely of Shamrock with base of York and Lancaster Rose and Thistle; wreath of Lilies of the Valley. (Made for funeral of the late Queen by Standish & Co., Court Florists, St. George's Place, S.W.)

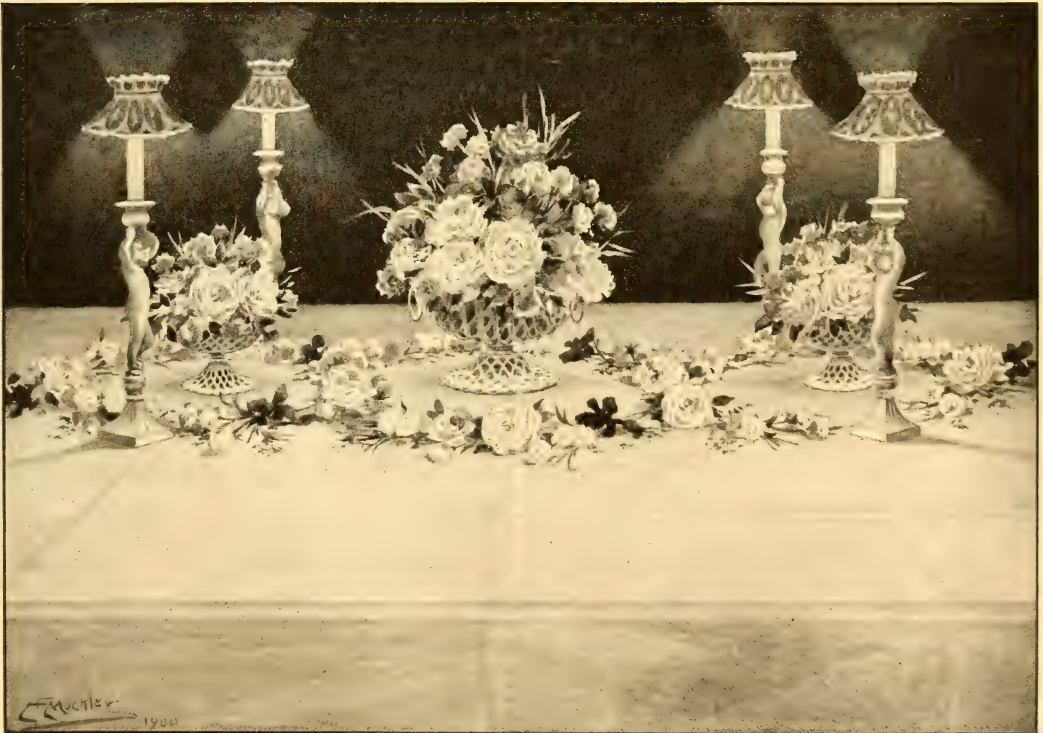


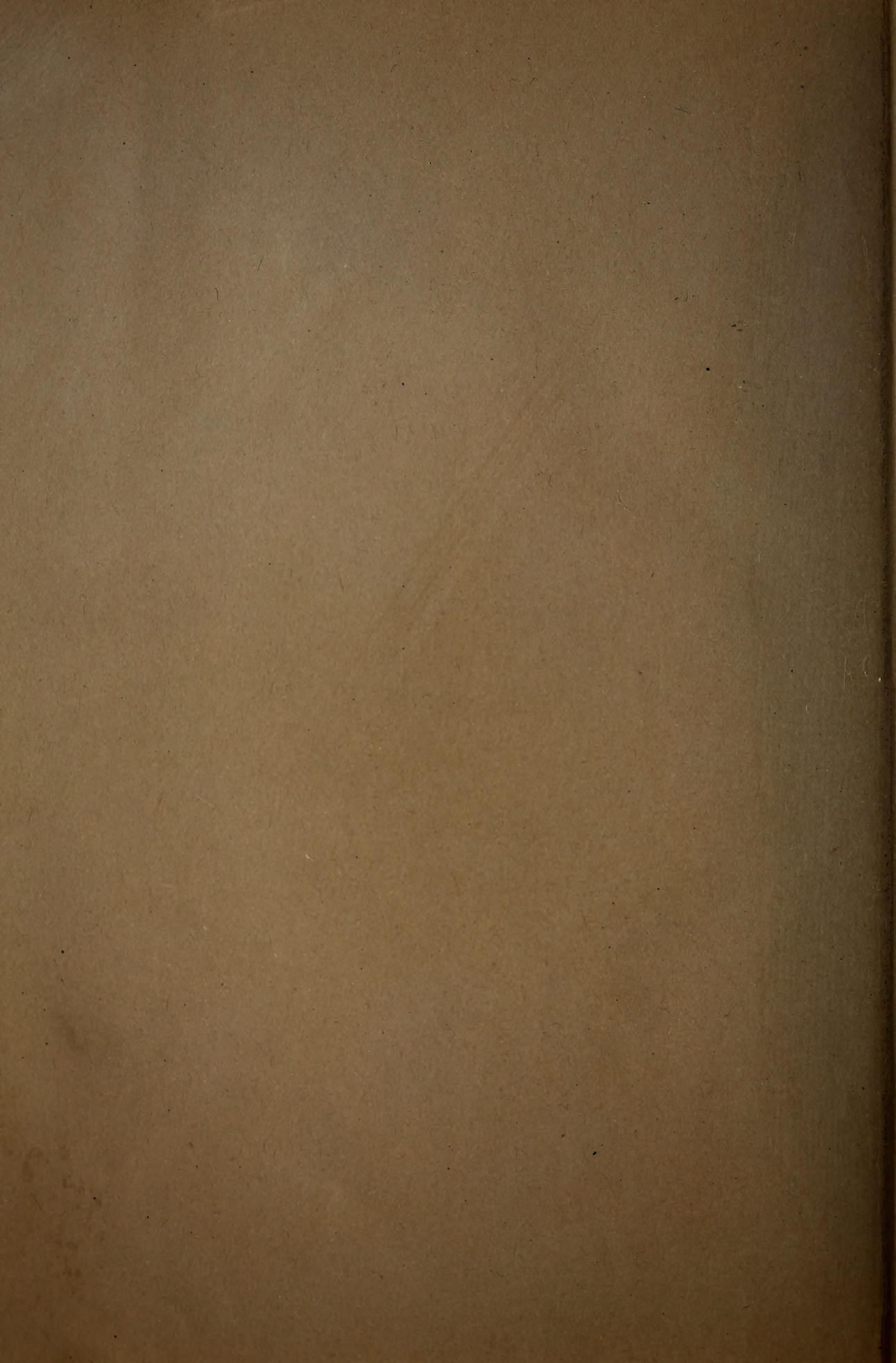
Fig. 787.—Floral Decoration for Dinner Table (June).

to the size of the dishes. Fruit and flowers should not be arranged on the same dish.

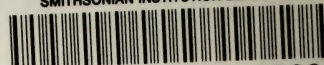
Whether fruit should form a portion of the decoration of a dinner-table is questioned by those who prefer to have their fruit presented to them fresh from a cool room. If it is to be used in the ornamentation of the table, the best way is to arrange a mixed collection of fruit in moss around the bottom of a graceful Palm as the central decoration, and to have a vase of flowers at each end of the table. In this case a duplicate set of fruit should be handed round,

to save interference with the centre ornament.

If it is preferred to put on two or four dishes of fruit, which is to be eaten after dinner, it is advisable to have prepared previously the same number of low vases of flowers, which should fill the places of the fruit-dishes as soon as the latter have been taken off the table. In this way a change is introduced in the effect of the decorations, instead of leaving so many vacant places in the arrangements, or putting back the disordered dishes of fruit. [J. H.]



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